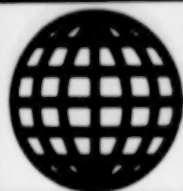


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**FOREIGN
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JPRS Report

Science & Technology

USSR: Chemistry

14 AUGUST 1987

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USSR: CHEMISTRY

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UDC 551.509.61

NECESSARY CONDITION FOR HETEROGENEOUS NUCLEATION OF ICE FROM VAPOR

Moscow KOLLODNYI ZHURNAL in Russian Vol 49, No 2, Mar-Apr 87
(manuscript received 20 Mar 85) pp 253-257

[Article by N. S. Kim and A. V. Shkodkin, Institute of Experimental Meteorology, Obninsk]

[Abstract] Based on data in the literature and experimental results on heterogeneous formation of ice, this work studied the condition of the existence of a water film of sufficient thickness on an ice-forming particle necessary for nucleation of ice. The need for existence of a polymolecular film of water of finite thickness on an ice formation kernel for nucleation of ice places limitations on the number of active nuclei under near-saturation conditions. The increase in equilibrium film thickness with increasing size allows activation by creation of complex structures consisting of a large non-ice-forming particle and a small particle with good crystallizing properties condensed or coagulated onto it. Introduction of hygroscopic additives can also activate ice-forming nuclei. The condition of existence of a polymolecular water layer on an ice-forming nucleus allows ice nucleation in the atmosphere to be studied from the standpoint of a single physical process. References 25: 10 Russian, 15 Western.

6508/5915

CSO: 1841/369

UDC 532.582.7

CALCULATION OF MIGRATION SPEED OF PARTICLE IN TURBULENT FLOW WITH TRANSVERSE SHEAR

Moscow KOLLODNYI ZHURNAL in Russian Vol 49, No 2, Mar-Apr 87
(manuscript received 6 Dec 83) pp 406-408

[Article by M. N. Chesnokov and A. A. Shiyan, Odessa University; Odessa Construction Engineering Institute]

[Abstract] Averaging of sets of turbulent pulsations in the transverse velocity component of a gas is used to derive an expression for the non-pulsating migration velocity of a particle in a turbulent flow with transverse

shear. An analytic solution is obtained for a model of gaussian gas velocity pulsations. The equations derived in this and previous work allow determination of the relationship between the migration velocity of particles and the characteristics both of the turbulent flow and of the particles themselves. References: 9 Russian.

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CSO: 1841/369

UDC 621.647.3

THEORY OF JET SPRAYING

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 60, No 4, Apr 87
(manuscript received 4 Mar 85) pp 807-813

[Article by R. S. KuznetSKIY]

[Abstract] A theoretical study is presented of a complex system of individual liquid-drop jets, steady trajectories of discrete mobile elements, drops of liquid following each other. The jets are studied at a distance from the output aperture of the sprayer such that drop formation is considered completed. The lines of individual liquid drop jets, if continued in a straight line toward the origin, are considered to intersect at a common point, which is arbitrarily selected as the coordinate origin. Equations are derived which can be used for more complex, practically-useful investigations of the hydrodynamics of liquid-drop sprays. Figure 1; references: 11 Russian.

6508/5915
CSO: 1841/406

MICROGELCHROMATOGRAPH

Moscow SOVIET EXPORT in English No 2, Mar-Apr 87 pp 40-41

[Article by Professor B. C. Belenkiy, doctor of chemical sciences, head, Analytical Laboratory, Institute of High Molecular Weight Compounds, USSR Academy of Sciences]

[Text] The KhZh-1309 microgelchromatograph is the first of a new generation of liquid chromatographs incorporating a laser refractometric detector and microcolumn 0.5 mm in dia.

The pioneering work done by Soviet engineers in the field of research instrument-making, made it possible to solve a number of sophisticated problems and culminated in the creation of a laser refractometric detector with a threshold sensitivity of 10^{-7} refraction units (corresponds to 10^{-4} per cent of a polymer solution), a 0.1 μ l measuring cell, and a 0.07 μ l injector. The chromatographic microcolumns 0.5 mm in dia. with molecular-weight calibration and a corrosion-resistant hydraulic system sparked off a marked expansion in the range of solvents adapted for analytical applications. Owing to the minute volume of columns, the amount of solvent used can now be confined to 50-70 μ l, allowing the employment of expensive and toxic reagents, such as trifluoroethanol, trifluoroacetic acid, as well as of other concentrated acids, strongly dissociating electrolytes, and highly concentrated salt buffers.

The instrument is furnished with a DVK-2 microcomputer, capable of calculating from gelchromatograms the molecular weight distributions (MWD) of oligomers and linear or branched polymers. In contrast to the known, up-to-date gelchromatographs, provision is made in the KhZh-1309 for chromatogram correction to account for instrumental broadening, as well as for instrument automatic calibration by various techniques.

The KhZh-1309 liquid microgelchromatograph is a versatile instrument which, unlike other currently available instruments, is capable of determining the MWD of any polymer, including highly polar polymers (polyamides, polyesters, polypeptides, polyaminoacids, etc.). A noteworthy fact is that only 30-100 ng of a polymer sample and 50-70 μ l of a solvent are required for conducting an analysis, the analysis time being from 10 to 15 minutes.

The KhZh-1309 chromatograph has been used for more than two years in the analytical laboratory of the Leningrad Institute of High-Molecular Weight

Compounds. Experts there have elaborated the requisite technique and investigated the MWD of various polymers, e.g., nylon-6, polyester-lavsan, liquid-crystalline polyesters, polyaminoacids and protein hydrolysates. Analysis of these highly polar polymers is practically impossible by conventional gel-chromatographs because it calls for large quantities of expensive and toxic reagents, whereas less than 30ml of trifluoroethanol was used by our laboratory to develop the procedure of determining the MWD of nylon-6.

The KhZh-1309 microgelchromatograph is indispensable in carrying out the highly-sensitive analyses of low-molecular compounds, such as steroids, lipids and prostaglandins that do not absorb UV radiation and necessitate refractometric detection under conditions of isocratic elution.

The instrument is exported by V/O Mashpriborintorg, 121200 Moscow, Telexes: 411235, 411236.

/5915

CSO: 1841/398

UDC 543.422:546.656

USE OF INTRACAVITY LASER SPECTROSCOPY TO DETERMINE RARE EARTH ELEMENTS WITH
COMPLEX ABSORPTION BANDS

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 42, No 3, Mar 87
(manuscript received 17 Sep 85) pp 473-476

[Article by M. V. Akhmanova, S. G. Ivanov, N. S. Stroganova and I. P. Galkina,
Institute of Geochemistry and Analytic Chemistry imeni V. I. Vernadskiy,
USSR Academy of Sciences, Moscow]

[Abstract] It was previously demonstrated experimentally that the method of intracavity laser spectroscopy can be used to determine a number of elements directly in solutions with lower detection limits than ordinary spectrophotometry. This article demonstrates that the complexity of absorption bands is not an obstacle to determination of low concentrations of rare-earth elements in solutions by this method. The limit of detection of Nd(III) in water was found to be $5 \cdot 10^{-6}$ M with absorption $0.4 \cdot 10^{-4}$ cm⁻¹, error $\pm 10\%$ rel. Figures 2; references 5: 4 Russian, 1 Western.

6508/5915
CSO: 1841/357

UDC 543.423.8

USE OF SYNCHROTRON RADIATION TO DETERMINE RARE-EARTH ELEMENTS IN ROCK

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 42, No 3, Mar 87
(manuscript received 29 Jan 86) pp 477-485

[Article by A. E. Gilbert, O. A. Kozmenko, V. B. Baryshev, K. V. Zolotarev and G. N. Kulipanov, Institute of Geology and Geophysics, Siberian Department, USSR Academy of Sciences; Institute of Nuclear Physics, Siberian Department, USSR Academy of Sciences, Novosibirsk]

[Abstract] A study is presented of the capabilities of synchrotron radiation for determination of rare-earth elements in rock. X-ray fluorescent analysis was used as the main method for quantitative determination of rare-earth elements, using the external standard technique. Standard specimens of rock were used to determine the limits of detection of rare-earth elements by this

method and the reproducibility of results. With synchrotron radiation, the method displayed a limit of detection of 0.10-0.25 g/t. Concentration by precipitation reduced this limit by a factor of 17. Scanning with a collimated synchrotron radiation beam allowed study of the distribution of rare-earth elements in rock sections. Figures 3; references 24: 16 Russian, 8 Western.

6508/5915
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UDC 543.544

IDENTIFICATION OF SULFUR-CONTAINING COMPOUNDS IN NATURAL OBJECTS BY GC-COMPUTER METHOD. IDENTIFICATION ALGORITHM

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 42, No 3, Mar 87
(manuscript received 29 Jan 86) pp 532-537

[Article by D. I. Grigoryeva, R. V. Golovnya, T. A. Misharina and A. F. Aerov, Institute of Heteroorganic Compounds imeni A. M. Nesmeyanov, USSR Academy of Sciences, Moscow]

[Abstract] The purpose of this work was to develop an algorithm for GC/computer identification of sulfur-containing compounds. [GC = gas chromatography] The algorithm was developed using a file of experimentally-determined values of retention index of sulfur-containing compounds, a data base of over 2000 indices of 564 sulfur-containing compounds. A flow chart of the algorithm is presented. The algorithm includes two methods of identification: Using the data base and a non-standard method involving calculation of indices of retention using a universal equation. References 11: 5 Russian, 6 Western.

6508/5915
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UDC 541.136

ROLE OF ENZYME ACTION MECHANISM IN MANIFESTATION OF ITS ELECTROCATALYTIC PROPERTIES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 293, No 2, Mar 87
(manuscript received 16 May 86) pp 383-386

[Article by A. L. Gindilis, A. I. Yaropolov and I. V. Berezin, corresponding member, USSR Academy of Sciences, Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences, Moscow]

[Abstract] There are several parameters which define non-mediated bioelectrocatalysis, including depth of location of the primary electron acceptor in the enzyme, electrode material, orientation of the enzyme on its surface and activity of the immobilized enzyme. This article presents a study intended to determine the factors influencing the possibility of non-mediated electron transport in bioelectrocatalysis. The study was performed on ceruloplasmin and laccase, enzymes with similar substrate specificity with respect to the electron donor, catalysing reactions involving molecular oxygen which is reduced to water, bypassing the formation of hydrogen peroxide. Ceruloplasmin is found to have no catalytic activity in the electroreduction of molecular oxygen. Ceruloplasmin catalyses the oxidation of donor substrates to form a trinary complex, while laccase performs catalysis by a ping-pong mechanism. The major reason for the possibility of redox enzyme electrocatalysis without a mediator is found in the mechanism of their action. Nonmediated electrocatalysis is possible only for enzymes utilizing the ping-pong mechanism in the solubilized state. The mechanism of catalysis forming a trinary donor-acceptor enzyme complex apparently requires more rigid conditions in terms of the structure of the complex, so that the electrode cannot act as a substrate and the enzyme is not electrocatalytically active. Figures 3; references 10: 8 Russian, 2 Western..

6508/5915
CSO: 1841/400

EXPERIMENTAL STUDY OF SOLAR CATALYTIC POWER DEVICE BASED ON CLOSED THERMOCHEMICAL CYCLE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 293, No 2, Apr 87
(manuscript received 3 Jun 86) pp 1427-1432

[Article by V. I. Anikeyev, V. A. Kuzmin, V. A. Kirillov, I. I. Bobrova, V. V. Pasichnyy and V. N. Parmon and K. I. Zamarayev, corresponding member, USSR Academy of Sciences, Institute of Catalysis, Siberian Department, USSR Academy of Sciences, Novosibirsk]

[Abstract] Results are presented from experimental studies of the steady work of a solar catalytic power installation using a closed thermochemical cycle based on the reactions of steam- CO_2 conversion of methane (endothermic stage) and methanation of synthesis gas (exothermic stage). Experiments were performed at the solar studies base of the Institute of Materials Sciences Problems, Ukrainian SSR Academy of Sciences in September of 1985 using a mirror solar concentrator. A diagram of the installation is presented. The studies experimentally confirm the possibility of using closed thermochemical cycles in a catalytic solar power plant for effective conversion of concentrated solar energy and its transmission over long distances in the form of hydrogen gas. Future versions should be able to transmit to consumers as much as 40% of the solar energy striking the solar catalytic reactor. Figure 1, references 12: 6 Russian, 6 Western.

6508/5915
CSO: 1841/400

UDC 538.6:535.379

STUDY OF RADICAL STAGE OF CHEMILUMINESCENT REACTION OF OXIDATION OF LUMINOL BY POTASSIUM FERRICYANIDE IN PRESENCE OF HYDROGEN PEROXIDE BY MAGNETIC MODULATION

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 294, No 1, May 87
(manuscript received 17 Jun 86) pp 143-147

[Article by M. M. Tribel, A. K. Morozov and Ye. L. Frankevich, Institute of Chemical Physics, USSR Academy of Sciences, Moscow]

[Abstract] An experimental study is presented of the radical stages of the complex chemiluminescence reaction of oxidation of LH_2 in the presence of H_2O_2 . The oxidizer selected was $\text{K}_3\text{Fe}(\text{CN})_6$. Several seconds before the beginning of the reaction, the solution of LH_2 was mixed with a solution of H_2O_2 and then the mixture was fed under pressure into the main mixer, which also received the $\text{K}_3\text{Fe}(\text{CN})_6$ solution under pressure, with the concentrations of the initial

reagents and the rate of their delivery to the mixer variable during the course of the experiment. The magnetic field increased the intensity of chemiluminescence, the variation of CL intensity with magnetic field strength following a saturated curve. An anomalous phase shift of over 90° was observed. The effect of the magnetic field on the Cl reaction is illustrated by a vector diagram, with vector arrow lengths proportional to the amplitude of modulation of CL intensity. With increasing magnetic field frequency, the amplitude of modulation in light generation channel I approaches 0, while the phase lag of the inertial component of CL approaches 180 degrees. At frequencies over 1 KHz only modulation of light generation channel II was observed. The experiment thus yielded numerical values for the intensity of the two modulation channels and the phase lag. Figures 3, references 10: 6 Russian, 4 Western.

6508/5915
CSO: 1841/388

UDC 541.128.13:541.124:542.941.7:546.26-162:546.74:542.973.6

INTERACTION OF CARBON (DIAMOND) WITH HYDROGEN IN PRESENCE OF NICKEL CATALYST

Moscow KINETIKA I KATALIZ in Russian Vol 28, No 2, Mar-Apr 87
(manuscript received 24 Jun 85) pp 313-318

[Article by S. Kh. Lifshits, A. P. Grigorev, deceased, and V. V. Kovalskiy, deceased, Institute of Geology, Yakutsk Affiliate, Siberian Division, USSR Academy of Sciences]

[Abstract] The purpose of this work was to refine the mechanism of hydrogenation of carbon materials in the presence of a nickel catalyst, which influences the limiting stages under various reaction conditions. The carbon material used consisted of twinned, flattened diamond crystals in the form of triangular plates formed of the (111) faces. Hydrogenation was performed at atmospheric pressure in flow-through reactors at a low concentration of methane. The variation in diamond hydrogenation rate as a function of temperature was studied in dry hydrogen in the presence of the nickel foil catalyst at 900-1200°C. At less than 950°C, the hydrogenation rate was independent of nickel foil thickness between 25 and 45 μm . Thicker foils decreased the reaction rate. The activation energy of the process at 950°C was 356.5 ± 21.0 kJ/mol. At over 1000°C, the hydrogenation rate began to increase, passing through a maximum, then dropping rapidly, the temperature of the maximum increasing with increasing foil thickness. The results indicate that catalytic hydrogenation of diamond occurs through a stage of dissolution of carbon in the metal, diffusion of carbon through the metal to the surface in contact with the gas, catalytic dissociation of molecular hydrogen to atomic hydrogen on the metal surface and interaction of the atomic hydrogen with the dissolved carbon, forming methane. At 1150-1200°C, poisoning of the nickel catalyst was observed, accompanied by formation of a thin graphite-like film on the outer surface of the metal. Figures 3, references 12: 3 Russian, 9 Western.

6508/5915
CSO: 1841/386

REGENERATION OF CYANOGEN CHLORIDE TRIMERIZATION CATALYST

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 2, Mar-Apr 87
(manuscript received 23 Dec 86) pp 24-25

[Article by B. F. Berezina and Yu. N. Komlev, "Ogrsteklo" Production
Association, Dzerzhinsk]

[Abstract] A heat treatment method was selected for regeneration of cyanogen chloride trimerization catalyst, including removal of ballast compounds from the surface of the catalyst. On a laboratory flow-through reactor consisting of a quartz tube 30 mm in diameter and 300 mm long equipped with an electric heating collar and thermocouple sleeve, the variation in degree of regeneration of spent catalyst as a function of time and temperature of heat treatment was determined. The activity of the catalyst is fully recovered in one hour at 900°C. This regeneration mode was tested on an industrial-scale installation, yielding satisfactory results.

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CSO: 1841/346

UDC 662.74:661.522.2

PRODUCTION OF QUALITY STANDARDIZED AMMONIUM SULFATE

Moscow KOKS I KHIMIYA in Russian No 4, Apr 87 pp 28-31

[Article by V. I. Belonoshchenko and N. F. Mikhayalov, Coal-Chemical Scientific Research Institute]

[Abstract] Coke-chemical enterprises require a method of processing ammonium sulfate with effective anticaking agents. Sulfonol is insufficiently effective for small-crystal ammonium sulfate. Caking can be reduced by complete or partial isolation of the crystalline grains, modification of the surface properties of the crystals, or inhibition of dissolution and crystal formation processes on grain surfaces. The third method is considered most promising. Studies performed at the authors' institute have determined that treatment with iron-containing additives in colloidal solutions is most effective. A new technology has been developed, based on differentiated dosing of the liquid additives so that the active component is applied to the surface of the crystal, synchronizing the flows of anticaking liquid and ammonium sulfate. An improved process of crystallization has also been tested with a pulsating crystal growth mode, demonstrating the possibility of preventing incrustation of cooling surfaces and walls of crystallizers, increasing productivity and product quality. References: 7 Russian.

6508/5915
CSO: 1841/351

UDC 662.74'764

OPERATION OF CLOSED WATER CYCLE FINAL GAS COOLING INSTALLATIONS

Moscow KOKS I KHIMIYA in Russian No 4, Apr 87 pp 33-35

[Article by Ye. Ya. Stetsenko, All-Union Coke-Chemical Station]

[Abstract] The use of closed water cooling, isolated from the atmosphere, is one method of eliminating entry of cyanogen into the atmosphere in the final cooling-tower-stage of gas cooling in the production of ammonium sulfate. This article briefly reviews the results of operation of such closed water cooling systems at the Novolipetsk Metallurgical Combine, Avdeyev Coke-Chemical Plant, Makeyevsk Coke-Chemical Plant and Zaporozhye Coke-Chemical Plant. Technological systems for closed cooling of water in this process are recommended.

6508/5915
CSO: 1841/351

TRIBUTE TO EXEMPLARY OPERATOR OF CENTRAL PLANT LABORATORY IN TRAINING AND CONTINUING EDUCATION OF WORKERS

Moscow KOKS I KHIMIYA in Russian No 4, Apr 87 pp 55-56

[Article by L. M. Radina, Altay Coke-Chemical Plant]

[Abstract] Raisa Sergeyevna Pevneva of the Altay Coke-Chemical Plant Laboratory is deeply involved in training and continuing education of workers at the plant. She conducts quarterly sessions of the training and methodologic commission in the shops, systematically works to improve her own educational level, trains all chemical analysis laboratory technicians, and prepares and offers continuing education courses for workers and administrators. She gives particular attention to safety problems and constantly encourages her students to study independently.

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UDC 66.01-52:5119.6

FORMALIZATION OF PROCESSING OF QUALITATIVE INFORMATION DURING CONTROL OF COMPLEX CHEMICAL TECHNOLOGY OBJECTS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 294, No 1, May 87
(manuscript received 7 Jul 86) pp 172-177

[Article by Academician V. V. Kafarov, I. N. Dorokhov, K. N. Smyslov and A. Yu. Soshnikov, Moscow Institute of Chemical Technology imeni D. I. Mendeleev; Institute of Structural Materials imeni I. A. Grishmanov, Belgorod]

[Abstract] The construction and use of fuzzy models can significantly decrease the computational complexity of the control algorithms for complex chemical technology objects, allowing most complete utilization of the experience of operators and technologists in the control of various objects without requiring great expenditures of computer time and memory for their implementation and functioning. A fuzzy model is one which includes at least one of its elements, such as purpose of existence, criterion of functioning status or functioning algorithm, in qualitative form. This article outlines an approach which has been used to construct a dialog system allowing formulation of optimal control actions utilizing the experience of expert operators of a chemical plant. The dialog system is implemented with an "Elektronika-60" microcomputer. References 5: 4 Russian, 1 Western.

6508/5915
CSO: 1841/388

CELITE AND ZEOLITE--EFFECTIVE HYDROGEN-ENCAPSULATING MEDIA

Baku AZERBAYDZHANSKIY KHIMICHESKIY ZHURNAL in Russian No 3, May-Jun 86, p 133

[Article by T. Sh. Rustamli and Sh. D. Osman-Zade, Institute of Inorganic and Physical Chemistry, AzSSR Academy of Sciences]

[Text] Encapsulation of hydrogen in zeolites is considered to be a promising method for the storage and transportation of this gas [1]. Among the so-far investigated zeolites, Cs, Na- and Cs, Ca-forms of A-type zeolite have the highest encapsulating capacity for hydrogen [1-2]. The hydrogen-encapsulating effect is attained in zeolite by the blocking of the eight-membered oxygen rings of α -nuclei by the large cations of cesium. On the basis of the data for Cs, NaA zeolite, the prognosis was made that at a pressure of 150-200 MPa, the encapsulating capacity of zeolite can be increased to 1.5 weight percent [1]. We have established that this limit can effectively be surpassed by using celite-type zeolite synthesized in sodium-cesium systems [3], the composition of the elemental nucleus of which corresponds to the formula $\text{Cs}_{4.6}\text{Na}_{9.6}^-$

$\text{Al}_{4.2}\text{Si}_{33.7}\text{O}_{99.6}$. Our experiments have shown that while CsNaA zeolite encapsulates 14 and 22 cu.cm/g (under normal conditions??) respectively, at the same pressures, cesite encapsulates 18 and 28.2 cu.m/g hydrogen, respectively, that is, almost 30 percent more. Since hydrogen is encapsulated preferably in α -nuclei, the higher encapsulating efficiency of cesite is probably due to the fact that the part of the space occupied in them by α -nuclei is larger than in the A-type zeolite (the skeleton of cesite is formed by the association of α -nuclei into an octahedral prism. The hydrogen encapsulating effect in cesite is attained when cesium contains about 2 cesium cations per one α -nucleus. Two variants of Cs+cation localization are possible, which ensure the blocking of eight-membered oxygen rings of the cesite skeleton: either in the plane of the ring or in the center of the octahedral prism.

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UDC 541.183:537

STRUCTURE OF DOUBLE ELECTRICAL LAYER UPON ADSORPTION OF POLYELECTROLYTE FROM NONAQUEOUS MEDIA

Moscow KOLLODNIY ZHURNAL in Russian Vol 49, No 2, Mar-Apr 87
(manuscript received 18 Mar 85) pp 276-283

[Article by N. A. Mishchuk and S. S. Dukhin, Institute of Colloid Chemistry and Water Chemistry, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] The development of the electrotechnology of dispersed systems has brought up new problems in the area of electrical surface phenomena. This article analyzes the problem of formation of a double layer in connection with the problem of optimizing electrokinetic information converters. The distribution of potential in a double layer is computed as a function of the conformation of adsorbed macroions, degree of dissociation of ionogenic groups and concentration of the indifferent electrolyte. It is found that the Stern potential depends strongly both on the summary surface charge and the dense portion of the adsorbed layer, and on the magnitude of secondary potentials. Figure 1, references 29: 9 Russian, 20 Western.

6508/5915
CSO: 1841/369

UDC 537.213.541.8

FORMATION OF DOUBLE ELECTRICAL LAYER UPON DISSOLUTION OF PHENOL-FORMALDEHYDE RESIN FILM

Moscow KOLLODNIY ZHURNAL in Russian Vol 49, No 2, Mar-Apr 87
(manuscript received 18 Apr 85) pp 293-303

[Article by L. Polman, V. M. Starov and N. V. Churayev, Institute of Physical Chemistry, USSR Academy of Sciences, Moscow; Institute of Physical Chemistry, German Democratic Republic, Berlin]

[Abstract] Low-molecular-weight phenol-formaldehyde resins form the main components of positive photoresistors used in the manufacture of film semiconductor microcircuits. This article presents a simple mathematical model of the dissolution of a phenol-formaldehyde resin film in a solution of alkali. It is

assumed, as the first approximation, that dissolution of a resin molecule requires only replacement of the hydrogen of one hydroxyl group with sodium. The model provides a qualitatively correct description of the rate of dissolution as experimentally determined as a function of alkali and neutral additive salt concentration. Figures 4, references 5: 1 Russian, 4 Western.

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UDC 541.183:537.871.52

ELLIPSOMETRIC STUDY OF ADSORPTION OF POLYFUNCTIONAL ORGANOSILICON MODIFIER ONTO SURFACE OF STEEL

Moscow KOLLODNYI ZHURNAL in Russian Vol 49, No 2, Mar-Apr 87
(manuscript received 26 Mar 85) pp 342-345

[Article by Ye. V. Zontova, V. A. Kotenev, N. I. Morozova and V. A. Ogarev, Institute of Physical Chemistry, USSR Academy of Sciences, Moscow]

[Abstract] A study is presented of the adsorption characteristics of the chemical modifier PAOS-6,8, polyfunctional aminoethoxysilane containing 8 ethoxy and 6 amine groups, onto the surface of type St. 3 steel by the method of ellipsometry. The index of refraction of the modifier was determined by computing the refraction of modifier molecules plus the volume occupied by each molecule in the condensed state. The density of the PAOS-6,8 was determined pycnometrically. The index of refraction was found to be much less on the surface than in the body, and the modifier was found to be firmly bonded to the substrate, indicating the formation of a grid on the surface of the steel. Figures 3, references 10: 8 Russian, 2 Western.

6508/5915

CSO: 1841/369

UDC 541.18:666.233

VARIATION IN PROCESS OF DIAMOND FORMATION AS FUNCTION OF INITIAL CARBONACEOUS MATERIAL CRYSTALLINE GRAIN SIZE

Moscow KOLLODNYI ZHURNAL in Russian Vol 49, No 2, Mar-Apr 87
(manuscript received 23 Apr 85) pp 352-353

[Article by N. T. Loladze, V. P. Polyakov and D. F. Fedoseyev, Moscow Institute of Steel and Alloys]

[Abstract] Equations are presented based on the colloidal theory of nucleation of diamond to determine the dimensions of graphite crystalline grains capable of forming a diamond crystalline seed. Experiments on the synthesis of diamond

from carbon-graphite material obtained by pyrolysis of methane were performed to test the equations. The dimensions of the carbon particles were 40-60 nm. Diamond was synthesized from the carbon materials at a temperature corresponding to an equilibrium graphite-diamond pressure of 4 GPa. As the pressure increased, diamonds were synthesized from the carbon material at lesser graphite crystalline grain thicknesses, confirming the basic statements of the colloidal theory of diamond nucleation. Figure 1, references: 2 Russian.

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CSO: 1841/369

UDC 541.182:66.067:546.42

REMOVAL OF STRONTIUM-89 FROM SOLUTION BY FOAM STRICTION CONCENTRATION OF COLLOIDS

Moscow KOLLODNYI ZHURNAL in Russian Vol 49, No 2, Mar-Apr 87
(manuscript received 12 May 86) pp 359-361

[Article by V. N. Maslov, Moscow Institute of Chemical Machine Building]

[Abstract] The purpose of this work was to determine the possibility of removal of strontium isotopes from solutions by the method of foam striction concentration of colloids. A series of experiments was performed using a nitric acid solution free of ^{89}Sr carriers, half life 54 days. The relative concentration of ^{89}Sr in the solutions was determined radiometrically. The fraction of radiation of ^{90}Sr and daughter ^{90}Y in the preparation was 1-3%. It was established in the experiments that during the first foaming cycle of 600 seconds, about 40% of the ^{89}Sr was extracted in the foam product, after which foam formation deteriorated due to a decrease in gelatin concentration. Six foaming cycles of 400-600 sec each were performed with addition of gelatin in a quantity of 75% of the usual dose each cycle. A graph of the remaining concentration after each cycle is very nearly linear, achieving at least 99.7% extraction of radioactive ^{89}Sr . Figure 1, references: 3 Russian.

6508/5915
CSO: 1841/369

NATURE OF LAYERS ADJACENT TO THE SURFACE OF A FAT SPHERE AND THEIR CHANGES AS IT MOVES

Moscow KOLLODNYI ZHURNAL in Russian Vol 49, No 2, Mar-Apr 87
(manuscript received 25 Feb 85) pp 376-378

[Article by I. I. Strakulenko and S. D. Zhernosekova, All-Union Scientific Research Institute of the Butter and Cheese Industry; "Uglich" Scientific-Production Association]

[Abstract] The movement of a sphere of milk fat was observed through a microscope with a 90 X objective, a 7 X ocular and a 20 X photoocular. A cone was seen to appear before a moving sphere, in which multiple layers were observed, resulting from redistribution of protein and phospholipid components in the solution near the surface of the moving sphere. The layers within the cone may have been caused by hydrodynamic waves generated by the surface of the sphere oscillating as a function of the speed of the incident stream. The layers are therefore visible due to surface oscillation effects. Figure 1, references 13: 12 Russian, 1 Western.

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UDC 541.12.038:538.122:541.14

INFLUENCE OF MAGNETIC FIELD ON PHOTORACEMIZATION OF OPTICALLY ACTIVE α -METHYLDEOXYBENZONIN

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 3, Mar 87 (manuscript received 2 Aug 85) pp 549-553

[Article by V. F. Tarasov, B. B. Klimenko and A. L. Bychachenko, Institute of Chemical Physics, USSR Academy of Sciences, Moscow]

[Abstract] The effectiveness of photoracemization of D- α -methyldeoxybenzoin in micelles of Na dodecylsulfate depends on the intensity of the external magnetic field. This effect is studied to produce the qualitative characteristics of the influence of magnetic interactions on recombination and disproportionation of triplet geminal radical pairs. The micellar surroundings determine the fate of the radicals formed, but influence little the mechanism of primary photochemical processes in the aromatic ketones. Photochemical conversion in micelles in this case is similar to conversions in homogeneous solutions. The effectiveness of photoracemization in the magnetic field of the earth is higher than in fields with $H \geq 250$ Oe by 20%, indicating the radical mechanism of the process. The probability of disproportionation of the benzoyl and 1-phenylethyl radicals is about 4.5 times less than the probability of their recombination, regardless of magnetic field. Figures 2, references 9: 2 Russian, 7 Western.

6508/5915
CSO: 1841/356

EFFECT OF MYCELLE STRUCTURES ON RADICAL-RECOMBINATION KINETICS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 4, Apr 87 (manuscript received 9 Oct 85) pp 762-766

[Article by P. P. Levin and V. A. Kuzmin, Institute of Chemical Physics, USSR Academy of Sciences, Moscow]

[Abstract] Kinetics of radical-recombination was studied by the method of laser photolysis. The radicals were forming during quenching of the triplet state of 2,6-diphenylbenzoquinone-1,4 (\underline{X}) with 4-phenylphenol and 4-phenylaniline in Na-alkylsulfate mycellae. In addition, the effect of ethanol and NaCl--which alter the structure of mycellae--was studied. Pulse photooxidation of \underline{X} in presence of ROH, forms radical pairs (RP) containing semiquinone radical $\underline{XH}\cdot$ and a phenoxy radical $\underline{RO}\cdot$. When \underline{X} is quenched with RNH_2 , electron transfer occurs with protonation of the anion radical $\underline{X}^{\cdot-}$. The RP radicals recombine in mycellae into the starting products or are removed into the external water. This recombination depends on mycellar structure, their size and microviscosity. In a strong magnetic field (MF) recombination kinetics of RP is less dependent on mycellar structure than in a null MF. This makes it possible to alter, selectively, the magnetic effect in recombination of RP by changing surfactants or by adding reagents capable of altering the structure of mycellae. Figures 2, references 13: 3 Russian (1 by Western author), 10 Western.

7813/5915
CSO: 1841/405

HYDRATION OF POLYVINYL ALCOHOL IN STRONG ELECTRIC FIELDS

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR: SERIYA B, GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 5, May 87 (manuscript received 23 Oct 86) pp 31-34

[Article by Yu. F. Deynaga and K. K. Popko, Institute of Colloid Chemistry and Water Chemistry, UkrSSR Academy of Sciences, Kiev]

[Abstract] The goal of this work was to investigate changes in dielectric properties of dispersed hydrophilic material as a function of the moisture content in weak and strong electric fields. Polyvinyl alcohol (MW 50-52,000) dispersed in vaseline was used. It was shown that the differences in dielectric isotherms obtained in these fields are due to lower energy barriers for charge transfers in strong fields leading to altered interaction between particles, to changed structure formation processes and interrelationship between

polarization and electroconductivity. The higher the tension of the electric field, the more intensive are the structure-forming processes but, then, the depolarizing effect resulting from charge transfer between particles occurs at lower level of moisture content. Figures 2, references 6: 4 Russian (2 by Western authors), 2 Western.

7813/5915
CSO: 1841/405

UDC 541.15

OZONOLYSIS OF COLLOIDAL SOLUTIONS AND SUSPENSIONS OF THIO- AND OXO-COMPOUNDS OF ARSENIC

Tbilisi SOOBASHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian, Vol 125, No 2, Feb 87 (manuscript received 7 Jun 85) pp 325-328

[Article by Ye. M. Nanobashvili and N. V. Abramishvili, Institute of Inorganic Chemistry and Electrochemistry, Georgian SSR Academy of Sciences]

[Abstract] A study is made of the oxidative transformation of colloidal systems of arsenic oxides and sulfides in the presence of a number of oxygen-containing reagents in order to permit more effective extraction of all components from arsenous sulfide ores and concentrates to protect the environment. Oxygen-containing reagents used were hydrogen peroxide and ozone. The data indicated that the arsenites contained as impurities in waste waters from production of arsenic can be quantitatively oxidized by hydrogen peroxide and ozone, forming arsenic (V) compounds, and can be extracted as arsenates. Figures 2, references: 3 Russian.

6508/5915
CSO: 1841/359

UDC 661.788.892

STRUCTURE FORMATION IN SOLUTION AND GEL OF METHYLCELLULOSE IN PRESENCE OF FILLERS AND ITS INFLUENCE ON STRUCTURE AND PROPERTY OF FILMS OBTAINED FROM THEM

Riga KHIMIYA DREVESINY in Russian No 1, Jan-Feb 87
(manuscript received 11 Oct 85) pp 41-47

[Article by L. G. Makhotina, V. G. Vasilev, G. G. Nikiforova, T. N. Matveyeva, L. Z. Rogovina, G. L. Slonimskiy and E. L. Akim, Leningrad Institute of Technology of the Cellulose and Paper Industry; Institute of Heteroorganic Compounds, USSR Academy of Sciences]

[Abstract] A study was made of the influence of fillers on the rheological properties of methylcellulose solutions and gels, as well as the properties of films produced from them. Methylcellulose films produced from both solutions

and gels were chemically cross-linked to increase water resistance; the elasticity modulus, equilibrium swelling and shrinkage tension upon repeated drying of the cross-linked films were studied as functions of the nature and content of filler and film production method. Titanium dioxide filler caused a monotonic increase in viscosity, while oxycellulose produced a curve of viscosity as a function of filler content with an extreme point. Up to 100% titanium dioxide increases the rate of gel formation and strength of three dimensional gel grid without influencing modulus of elasticity of the gel, but increases modulus of elasticity of non-cross-linked films. Further increases in TiO_2 content decrease all of these properties. Oxycellulose results in an increase of these properties throughout the entire concentration interval studied. Titanium dioxide and oxycellulose have a different influence on modulus of elasticity, equilibrium swelling and secondary shrinkage tension. One possible mechanism of the phenomena observed is the difference in localization of the two fillers studied in the grid of the gel. Figures 4; references: 11 Russian.

6508/5915
CSO: 1841/349

UDC 543.257.2:541.135.5

INTERRELATIONSHIP OF COMPLEX-FORMING, EXTRACTION AND MEMBRANE-ACTIVE PROPERTIES OF CROWN ETHERS

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 42, No 3, Mar 87
(manuscript received 4 Dec 85) pp 429-434

[Article by Sh. K. Norov, Bukhara Institute of Technology of Food and Light Industries]

[Abstract] Continuing previous studies on the complex-forming, extraction and ionophoric properties of crown ethers, this article analyzes the interrelationships among these properties. The interrelationships of complex-forming, extraction and membrane-active properties of dialkyl derivatives from $-C_2H_5$ to $-C_8H_{17}$ of dibenzo-18-crown-6, diethyl-dibenzo-24-crown-8 and diethyl-dibenzo-30-crown-10 is studied. Comparison of the ratios of complex stability constants with Na, K, Rb and Cs ions and relationships of the corresponding extraction constants with potentiometrically-measured selectivity constants demonstrates that the cation selectivity of electrode membranes based on crown ethers is determined by the transfer (extraction) stage of the complex cation through the membrane-aqueous solution interface. References 18: 14 Russian, 4 Western.

6508/5915
CSO: 1841/357

UDC 539.377;539.4.19

ROLE OF ELASTIC AND THERMOELASTIC STRESSES IN INITIATION OF EXPLOSION OF SOLIDS UNDER HIGH PRESSURE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 293, No 2, Mar 87
(manuscript received 22 Oct 86) pp 389-392

[Article by Academician N. S. Yenikolopyan, A. A. Khzardzhyan, S. M. Khzardzhyan, G. Ya. Malinovskiy and G. A. Amirdzhanov, Institute of Synthetic Polymer Materials, USSR Academy of Sciences, Moscow]

[Abstract] An experimental study is presented of the conditions of initiation of an explosion in solid substances by application of high pressure, high pressure and an electric voltage, or high pressure and heat. Studies were performed on $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ pressed into 300 mg tablets. It was found that elastic and thermoelastic stresses play a significant role in the initiation of the explosion of solid substances under high pressure. Relaxation processes occurring in solids under high pressure, with and without electrical and thermal stress, must also be considered. The system studied has a minimum critical pressure, such that application of electric voltage or thermal stress at pressures beneath the critical pressure does not initiate an explosion. There is another critical pressure at which explosion occurs without the application of external heat or electrical voltage. Figure 3, references: 7 Russian.

6508/5915
CSO: 1841/400

UDC 536.46

STATIONARY COMBUSTION OF NONGASIFYING CONDENSED SUBSTANCES IN PRESENCE OF HEAT LOSSES INTO SURROUNDING MEDIUM

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 4, Apr 87
(manuscript received 14 Oct 85) pp 964-971

[Article by V. I. Lyubchenko]

[Abstract] The goal of this study was to develop an asymptotic theory of non-adiabatic combustion waves of nongasified condensed systems in n -th order reactions where activation temperature significantly predominated over the

adiabatic flame temperature. This assumption made it possible in a preceding paper [this journal source, pp 958-963] to solve the problem of adiabatic deflagration during stationary combustion of a condensed medium. Formulas were obtained for the calculation of principal characteristics of combustion as a function of heat loss level. Critical values were calculated at which the stationary combustion of substances became impossible. The theory and formulas were checked out on the example of nongaseous combustion of iron-aluminum thermite showing excellent agreement between the theoretical and experimental data. Figures 2, references 14: 10 Russian, 4 Western (1 by Russian author).

7813/5915
CSO: 1841/383

UDC 536.46

STATIONARY THEORY OF NONADIABATIC COMBUSTION WAVE SPREAD IN HOMOGENEOUS GAS MIXTURE

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 4, Apr 87
(manuscript received 14 Oct 85) pp 958-963

[Article by V. I. Lyubchenko]

[Abstract] Laminar diffusion flame cannot spread in narrow channels because of heat losses into the surrounding medium. The goal of this work was to develop the theory of nonadiabatic deflagration and evolve formulas for flame spread rate in round tubes as a function of heat loss into the environment. This analysis was based on an assumption of significant predominance of the activation temperature over the adiabatic flame temperature. Formulas were developed for calculation of the highest temperature, mass rate, diameter of the tube and critical concentration of active non-reacted chemical component of the mixture in relationship to heat loss. Figures 3; references 11: 8 Russian, 3 Western.

7813/5915
CSO: 1841/383

UDC 541.126 + 536.48

GAS PHASE IGNITION OF CELLULOSE MATERIALS BY STREAM OF RADIANT ENERGY

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 4, Apr 87
(manuscript received 14 Oct 85) pp 953-957

[Article by V. I. Lyubchenko, Z. R. Yudina and G. N. Marchenko]

[Abstract] Analysis of gas phase inflammation regimens of woody materials assumes that during the heating by a source of external energy, thermal decomposition of the material takes place with emission of volatile materials

which diffuse into the gaseous phase, mixing with the oxidizer. At a specific moment, this mixture ignites spontaneously. The goal of the present work was to develop gas phase theory of inflammation of cellulose materials based on an asymptotic method of heat theory. The following assumptions were made: 1) gas mixture is reactive; 2) mass transfer processes in the reactive system are excluded; 3) heat effect of the pyrolysis is zero, and 4) free convection in the gas phase approximates the coefficient μ which reflects molar mechanism of heat transfer. Based on this, an asymptotic theory of a dynamic regimen for gas phase inflammation of cellulose material was developed leading to kinetic constants and basic characteristics of the ignition. Thermodynamic constants were determined for oak and pine. Figures 2, references 10: 6 Russian, 4 Western.

7813/5915
CSO; 1841/383

UDC 548.737:547.414:547.518

STRUCTURAL AND ELECTRON PARAMETERS OF CERTAIN CYCLICAL NITRAMINES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 3, Mar 87 (manuscript received 6 Sep 85) pp 576-580

[Article by N. G. Zhitomirskaya, L. T. Yeremenko, N. I. Golovina and L. O. Atovmyan, Section of the Institute of Chemical Physics, USSR Academy of Sciences, Chernogolovka]

[Abstract] The method of fragmentary computation of the electron structure of large compounds was used to calculate the electron parameters of several cyclical nitramines based on the experimentally-determined coordinates of the atoms to determine the influence of the electron parameters of molecules on their packing in a crystal. The distribution of intermolecular contacts in the compounds studied was analyzed. The summary charges on the nitro group atoms in the molecules studied were found to vary. Packing of the molecules in crystals and the resultant crystalline density depend essentially on the electron parameters of the molecules. Figures 4, references 10: 7 Russian, 3 Western.

6508/5915
CSO: 1841/356

MECHANISM OF BRANCHED CHAIN REACTION $\text{NF}_2 + \text{H}_2\text{O}_2$

Moscow KINETIKA I KATALIZ in Russian Vol 28, No 2, Mar-Apr 87
(manuscript received 11 Apr 86) pp 273-278

[Article by Yu. R. Bedzhanyan, Yu. M. Gershenzon, O. P. Kishkovich, A. B. Nalbandyan, V. B. Rozenshteyn and Sh. Sh. Maksyutov, Institute of Chemical Physics, USSR Academy of Sciences, Moscow]

[Abstract] A quantitative model of the branched chain reaction of $\text{NF}_2 + \text{H}_2\text{O}_2$ is suggested and tested by comparison of calculated and measured values of limits of spontaneous combustion and the variation in concentrations of NF_2 and HO_2 as a function of time. Experiments were performed on a jet vacuum installation combined with a spectrometer. A completely self-consistent description is obtained including independent determination of rate constants of all the elementary stages and modeling of the kinetics of the branched chain reaction both with respect to the initial substance and the branching active center. Figures 4, references 13: 8 Russian, 5 Western.

6508/5915
CSO: 1841/386

UDC 536.46;541.126

THEORY OF NONSTEADY COMBUSTION OF FUEL AT HIGH PRESSURES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 294, No 1, May 87
(manuscript received 24 Jul 86) pp 103-106

[Article by I. G. Assovskiy, Institute of Chemical Physics, USSR Academy of Sciences, Moscow]

[Abstract] The correctness of the phenomenological theory of nonsteady combustion of homogeneous diatomic fuels is demonstrated under conditions of increasing pressure to P_k on the order of 10^8N/m^2 or more with certain limitations on pressure change time. The existence is demonstrated for such combustion modes of an asymptotic solution in analytic form. The use of the solution for typical nonsteady combustion problems is demonstrated.
References: 15 Russian.

6508/5915
CSO: 1841/388

UDC 531.135.5

STUDY OF ION-SELECTIVE FIELD-EFFECT TRANSISTORS (pH-SENSING TRANSISTORS)

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 60, No 4, Apr 87
(manuscript received 31 Oct 85) pp 755-760

[Article by Yu. G. Vlasov and A. V. Bratov]

[Abstract] Ion-selective field-effect transistors (ISPT) are second generation ion-selective electrodes utilizing the achievements of ionometry and micro-electronics, distinguished by their small size, fully solid-state manufacture, low output signal impedance and capability for the use of new ion-sensitive materials with high internal impedance. This article presents a study of pH-sensitive ISPT with silicon nitride as the ion-sensitive layer. Factors determining the stability of operation of the ISPT include chemical composition and method of processing of the nitride. Specimens retained their operating capacity for 6 to 9 months of periodic operation with storage in air. When held constantly in a solution, drift and leakage current increased after 150-200 hours, specimens failed after 300-350 hours due to a loss of seal and the appearance of parasitic currents. Sealing-compounds with better characteristics could improve service life. Figures 5, references 8: 4 Russian, 4 Western.

6508/5915
CSO: 1841/406

UDC 543.241.5

POLYTHERMIC STUDY OF CONDUCTIVITY AND DISSOCIATION OF LITHIUM HALIDES IN HEXANOL

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 57, No 3, Mar 87
(manuscript received 4 Mar 86) pp 676-682

[Article by I. N. Vyunnik, O. N. Kalugin and V. N. Kalitenko, Kharkov State University imeni A. M. Gorkiy]

[Abstract] A study was performed of conductivity and dissociation of lithium chloride and bromide in hexanol in the concentration interval $6 \cdot 10^{-5}$ - $7 \cdot 10^{-2}$ mol/l at temperatures of 5-155°C at intervals of 10-20°C. A reliable criterion was found for selecting the maximum concentration of electrolyte used in

calculations of molar conductivity λ_0 and dissociation constant pK_d , based on joint analysis of the variation in dispersion of the approximation and the calculated parameters as functions of the maximum concentration and theoretical estimate considering the temperature and incomplete dissociation of the electrolyte. The temperature maximum on polytherms of λ_0 and pK_d increases in the sequence LiBr, LiCl, LiI, whereas the opposite trend is observed in the sequence LiI, NaI, KI. Figures 3, references 25: 14 Russian, 11 Western.

6508/5915
CSO: 1841/358

UDC 543.25

BACKGROUND CURRENTS OF CARBON MONOFILAMENT AS FUNCTIONS OF PRODUCTION TEMPERATURE

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 42, No 3, Mar 87
(manuscript received 18 Mar 85) pp 441-444

[Article by A. N. Doronin and G. G. Muntyanu, Institute of Geochemistry and Analytic Chemistry imeni V. I. Vernadskiy, USSR Academy of Sciences, Moscow; Institute of Chemistry, Moldavian SSR Academy of Sciences, Kishinev]

[Abstract] Type UMV-30 carbon monofilaments 30 μm in diameter were obtained at 1000-2800°C. Potentiodynamic measurements in a solution of HClO_4 were performed relative to a silver chloride electrode. It was found that heat treatment temperature during manufacture of the monofilaments influenced background currents. The background currents, determined by adsorption and desorption of hydrogen and oxygen, decrease with increasing heat treatment temperature, reaching a minimum at 1800°C and remaining practically constant to 2800°C. The manufacturing temperature does not influence the interval of potentials over which adsorption-desorption of hydrogen and oxygen occur. Figures 3, references: 3 Russian.

6508/5915
CSO: 1841/357

ENERGY DESCRIPTION OF ELECTROCHEMICAL POWER STATIONS UTILIZING HIGH-TEMPERATURE METHANE CELLS

Moscow ELEKTROKHIMIYA in Russian Vol 23, No 4, Apr 87
(manuscript received 1 Jul 85) pp 462-468

[Article by N. V. Korovin, G. N. Voloshchenko and V. F. Vagin, Moscow Energy Institute]

[Abstract] An energy analysis was conducted on the efficiency of potential electrochemical power stations operating on high-temperature methane cells. The overall reaction may be described by the following equation: $3\text{CH}_4 + \text{CO}_2 + 2\text{H}_2\text{O} \rightleftharpoons 4\text{CO} + 8\text{H}_2$. The CO_2 and water vapor are generated by a high-temperature fuel cell utilizing a solid electrolyte for the anodal reaction. A portion of the chemical energy that is not converted into electrical energy is transmitted as heat energy to turbine generators for the production of electricity. The theoretical operating efficiency of such stations appears to be on the order of 50-60%. Figures 6, references 5: 2 Russian, 3 Western.

12172/5915
CSO: 1841/387

LITHIUM PASSIVATION IN THIONYL CHLORIDE SOLUTIONS CONTAINING BROMINE AND BROMINE CHLORIDE

Moscow ELEKTROKHIMIYA in Russian Vol 23, No 4, Apr 87
(manuscript received 17 Jul 85) pp 497-500

[Article by V. P. Ponkratov, V. A. Mozalevskaya, N. V. Shavrin and V. M. Frolov, Moscow]

[Abstract] An electrochemical analysis was conducted on lithium passivation of lithium and glass carbon electrodes as affected by bromine and bromide chloride in thionyl chloride solutions. Analysis of the time course of polarization resistance and electrode potential showed strong dependence of these parameters on solvent composition. On the basis of these observations the following chemical reactions were identified under equilibrium conditions as affecting passivation: $\text{SOCl}_2 + \text{Br}_2 \rightleftharpoons \text{SOBrCl} + \text{BrCl}$ and $2\text{BrCl} \rightleftharpoons \text{Br}_2 + \text{Cl}_2$. In addition, the solvent may also be involved in dissociation of BrCl : $\text{SOCl}_2 + \text{BrCl} = \text{SOBrCl} + \text{Cl}_2$. The behavior of the electrodes in the solvent system involved was largely predicated on the latter two reactions. Figures 3, references 17: 7 Russian, 10 Western.

12172/5915
CSO: 1841/387

EFFECTS OF DISPERSIVE CAPACITY OF PLATINUM ON ELECTROCHEMICAL PROPERTIES
OF THREE-PHASE INTERFACE IN WATER ELECTROLYSIS WITH SOLID POLYMERIC
ELECTROLYTE

Moscow ELEKTROKHIMIYA in Russian Vol 23, No 4, Apr 87
(manuscript received 20 Dec 85) pp 548-550

[Article by V. N. Fateyev, L. L. Antonova, G. V. Balakirev, V. A. Kondratyev
and M. A. Sevastyanov, Scientific Research Physical Chemical Institute imeni
L. Ya. Karpov, Moscow]

[Abstract] The use of solid polymeric electrolytes represents one of the more important developments in water electrolysis. Such systems involve electrochemical reactions in a three-phase complex represented by the catalyst/solid electrolyte/water interface, with the structural characteristics determining the energetic efficiency of the entire process. An analysis was conducted on factors bearing on the efficiency of a system relying on polymeric electrolyte MF04 SK and dispersed platinum. Analysis of the electrochemical characteristics demonstrated that only a portion of the platinum particles fulfill the role of a current conductor. These are platinum particles deposited on the surface of the membrane and do not of necessity participate in the catalytic reactions. The latter role is fulfilled by platinum imbedded in the membrane bulk. Further experimentation demonstrated that approximately half of the 0.01 μm platinum particles could be replaced by 1 μm AG-3 activated charcoal particles without reducing the electrolytic efficiency of the system. These findings indicate that in certain circumstances platinum can be replaced by less expensive materials in the membrane electrolysis systems. Figures 3, references 3: 1 Russian, 2 Western.

12172/5915
CSO: 1841/387

UDC 546.77+546.24+546.34+548.734.384

SYNTHESIS AND ROENTGENOGRAPHIC STUDY OF $\text{Li}_{3.5}\text{Mo}_6\text{Te}_8$

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 32, No 5, May 87
(manuscript received 1 Aug 85) pp 1013-1016

[Article by Yu. V. Mironov, P. P. Samoylov, V. Ye. Fedorov, V. I. Lisoyan and
S. A. Gromilov, Institute of Inorganic Chemistry, Siberian Division of USSR
Academy of Sciences]

[Abstract] Considerable attention is being paid to interchanneling of alkaline metals into layered structures which can be used in production of primary and secondary current sources. Compounds like Mo_6X_8 which are capable of forming Chevrel phases $\text{M}_x\text{Mo}_6\text{X}_8$ ($\text{X} = \text{S}, \text{Se}, \text{Te}$) have not been studied exhaustively. A

phase $\text{Li}_{3.5}\text{Mo}_6\text{Te}_8$ was obtained by reaction of Mo_6Te_8 with butyllithium solution in hexane using Schlenk vacuum ampoules. Reaction occurred in 5 days at room temperature. Roentgenographic analysis of this sample gave the following values: $a = 7.062 \text{ \AA}$, $\alpha = 92.52^\circ$, $V = 351.1 \text{ \AA}^3$. For $z = 1$ the calculated density was 7.664 g/cm^3 . References: 9 Western.

7813/5915

CSO: 1841/407

UDC 574/577:539.16:574.587(262.5)

RADIOECOLOGIC PARAMETERS OF ACCUMULATION AND LOSS OF ^{137}Cs BY BOTTOM
SEDIMENTS IN BLACK SEA ESTUARY (UNDER LABORATORY CONDITIONS)

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR: SERIYA B, GEOLOGICHESKIYE,
KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 5, May 87
(manuscript received 8 Dec 86) pp 76-79

[Article by G. G. Polikarpov, G. Ye. Lazorenko, N. V. Demina and N. N.
Tereshchenko, Institute of Biology of the Southern Seas, UkSSR Academy of
Sciences, Sevastopol]

[Abstract] ^{137}Cs accumulations in marine and fresh waters have been studied
adequately; less is known about the estuaries which represent a transition
between salt and fresh waters. Accumulation and loss of ^{137}Cs were evaluated
experimentally in bottom sediments from Dnepr sediments during the summer
season. It was shown that the highest adsorption of ^{137}Cs occurs in clay
deposits (755) and the lowest in finely dispersed sand (79); silt placed
between above extremes. In small, poorly flowing waters, silt can accumulate
very high levels of ^{137}Cs (2500). Desorption and loss of this radionuclide is
low for all types of sediments and does not exceed 5% in 8 days of observation.
References 9: 6 Russian, 3 Western (1 by Russian author).

7813/5915
CSO: 1841/405

COMPARATIVE ANALYSIS OF VARIATIONS IN EMISSION OF SODIUM AND ATOMIC OXYGEN
AT 557.7 nm

Ashkhabad IZVESTIYA AKADEMII NAUK TURKMENSKOY SSR: SERIYA FIZIKO-
TEKHNICHESKIKH, KHIMICHESKIKH I GEOLOGICHESKIKH NAUK in Russian No 1,
Jan-Feb 87 (manuscript received 16 Dec 85) pp 81-83

[Article by M. P. Korobeynikova and V. G. Khamidulina, Physical-Technical
Institute, Turkmenian SSR Academy of Sciences]

[Abstract] Data on variations in the intensity of various emissions and their
interrelationships are used to establish dynamic processes in the upper
atmosphere. Measurements of emissions at 557.7 nm allow estimation of the

content of atomic oxygen near the altitude peak; the emission of sodium is proportional to the concentration of ozone and can therefore be used to determine the content of O_3 ; emissions of OH can be used to determine the temperature in the emission layer. An automatic electrophotometer with rocking filter was used to perform observations in 1973-1976, including recording of the intensity of emissions of sodium and atomic oxygen at 557.7 nm in the zenith area of the sky on all clear, moonless nights. The following regularities were observed: a similar nightly course of intensities was observed, with the oxygen emission at 557.7 nm generally leading the sodium emission by 1.5-2 hours. The mean nightly course of simultaneous observations showed a maximum of oxygen green line intensity between midnight and 2 am with a slight increase in sodium intensity between 2 and 4 am. The resulting calculated vertical rate of propagation of wave motions is about 4 km/hr. The phase shift may also be explained by long-period oscillations under the influence of the midnight tidal wave mode. Figure 1, references 4: 1 Russian, 3 Western.

6508/5915

CSO: 1841/355

MINERAL FERTILIZER INDUSTRY

Moscow EKONOMICHESKAYA GAZETA in Russian No 17, Apr 87 p 6

[Article by V. Markov]

[Text] This winter was quite difficult for this branch of industry. There have been interruptions in electric current and gas supply, which has complicated the work of enterprises. However, the plan of the most difficult month--January--has been fulfilled by the whole Ministry. This has been done not only concerning the quantity, but also the kinds of fertilizers, which is important for the national economy.

Along with this, 12 enterprises have failed to achieve the January assignments. Thus, the Cherkassk Production Association "Azot" owed 2000 tons of mineral fertilizers, the Meleuzovskiy and Balakovskiy chemical plants--1900 and 4800 tons, respectively. This made it necessary to correct the distribution of products, change the freight traffic: this resulted in a failure in the formation of wagons, delayed delivery and, finally, in a lowering of the effect of chemicalization.

In the Ministry, special attention has and had been paid to the lagging plants and associations. Concrete measures have been worked out for each of them to make up faster for the delay.

Purposeful work with those falling behind has brought results. Thus, the "Azot" Cherkassk PO (Production Association), Meleuzovskiy, Balakovskiy and many other plants have already made up in February for the January failed obligations. In the Balakovskiy chemical plant, the plan of the first quarter was fulfilled 103.7 percent, in the Meleuzovskiy plant--103.5 percent. Together, the plants produced more than 6000 tons of fertilizer granules above the plan. 7300 Tons more fertilizers were produced in the Cherkassk "Azot" PO than planned.

The industry has completely fulfilled the plan of the first quarter: 386,000 tons of mineral fertilizers and 2000 tons of plant protective agents above plan were furnished to the farms.

"We attribute the successful achievement of the quarter to industrial reorganization," says the First Vice Minister, for the production of mineral fertilizers, A. Kochetkov. And this was begun by the central apparatus, the style of

its work. The responsibility of the subdivisions and the efficient executers has been enhanced, the number of meetings and sessions were considerably reduced, and the leaders were called less often to the Ministry.

"The shift of the industry since 1986 to new management conditions has great significance. Many enterprises turned to the Ministry requesting to increase the plan for manufacturing different kinds of products. The plants and enterprises are using available resources more profitably.

"According to the results of the first quarter", continues A. Kochetkov, "a main concern is caused now only by the Novgorod PO of "Azot" and the Rossochanskiy chemical plant in the Voronezh Oblast. Here, they are still unable to get out of trouble. Presumably, with joint efforts, their work will be successfully stabilized. We have some experience in this matter. The Rustavi PO of "Azot" considered by many as "hopeless" has long been among those falling behind. Its operation was put under special control; the causes of failures have been analyzed. The problem of raw material and spare parts supply has been resolved. Qualified specialists from the "Orgminudobreniye" trust instructed plant managers, on the spot, and analyzed and eliminated with them the causes of failures. As a result, this year, the plant is not only fulfilling the plan, but the rate of growth is also being accelerated."

12999/5915
CSO: 1841/335

INFLUENCE OF MIXTURE OF LIGNOSULFONATES AND UREA-FORMALDEHYDE RESIN ON
PROPERTIES OF GRANULATED POTASSIUM CHLORIDE

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 60, No 4, Apr 87
(manuscript received 23 Apr 85) pp 718-721

[Article by N. P. Krutko, Ye. V. Vorobyeva, F. F. Mazheyko and L. M. Starkov,
Institute of General and Inorganic Chemistry, BSSR Academy of Sciences]

[Abstract] A study is presented of the influence of an interpolymer complex based on lignosulfonates and urea-formaldehyde on the physical and mechanical properties of granulated potassium chloride. A method was developed of producing nondusting potassium fertilizers with extended useful life by using lignosulfonates together with urea-formaldehyde resin 1-2% of the KCl mass as a binder additive for potassium chloride. The compressive strength and degree of dissolution are improved by a factor of more than 2 in comparison to the untreated KCl, by almost 50% in comparison to the addition of 2% urea-formaldehyde resin. This results from an increase in the binding action of the mixture due to the formation of an interpolymer complex. Figure 1, references: 10 Russian.

6508/5915
CSO: 1841/406

UDC 621.315.592

SELECTIVE MAXIMA IN PHOTOCONDUCTIVITY SPECTRA OF CdTe CRYSTALS

Ashkhabad IZVESTIYA AKADEMII NAUK TURKMENSKOY SSR: SERIYA FIZIKO-TEKHNICHESKIKH, KHIMICHESKIKH I GEOLOGICHESKIKH NAUK in Russian No 1, Jan-Feb 87 (manuscript received 10 Jun 86) pp 37-42

[Article by Ya. A. Agayev, G. Garyagdyev, V. V. Dyakin, V. V. Koval and Kh. Rakhymov, Turkmenian Polytechnic Institute]

[Abstract] The photoconductivity spectra of CdTe single crystals have a maximum corresponding to zone-zone absorption at $0.78 \mu\text{m}$ (100 K) plus a long-wave photoconductivity branch with red boundary $1.74 \mu\text{m}$, resulting from direct excitation of electrons with r-centers in the conductivity zone. Parameters of the r-centers differ significantly from crystal to crystal, possibly due to interaction of sensitivity centers with other structural defects. This article studies the photoconductivity spectra of CdTe n-type single crystals with resistivity $3.5 \cdot 10^6 - 9 \cdot 10^7 \text{ Ohm}\cdot\text{cm}$ to determine this type of interaction. Absorption in the photoconductivity area at $h\nu = 1.535 \text{ eV}$ in donor-acceptor pairs places a photoelectron in the conductivity zone, while the hole is localized on the acceptors, probably by an Auger mechanism. The interaction between centers explains the relatively high photosensitivity at 1.535 eV . Figures 2, references: 14 Russian.

6508/5915
CSO: 1841/355

GLASS FOR PROTECTION OF SEMICONDUCTOR DEVICES BASED ON GALLIUM PHOSPHIDE FROM THE EFFECTS OF CORROSIVE MEDIA

Tbilisi SOOBASHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian Vol 125, No 2, Feb 87 (manuscript received 5 May 85) pp 337-340

[Article by O. Ye. Modebadze, Institute of Cybernetics, Georgian SSR Academy of Sciences]

[Abstract] Results are presented from the synthesis and application of glass for protection of the active portion of semiconductor devices made of gallium phosphide crystals from external effects. The glass studied in the article is a borosilicate glass containing various alkaline oxides not over 14 wt.% plus WO_3 to decrease the melting point of the charge without reducing moisture resistance of the glass, ZrO_2 and Al_2O_3 to increase resistance to various corrosive media. The glass can be used as a matrix for the production of light sensitive and luminescent glasses. The glass wets the surface of GaP well, producing vacuum-tight reliable seals at 560-590°C. The glass can be worked with a gas burner. Addition of Ag and CeO_2 causes the glass to be light sensitive and luminescent. Addition of small quantities of silver alone yields a bright orange color. Addition of CeO_2 and Ag in small quantities has little effect on coefficient of linear thermal expansion of the glass. Exposure to ultraviolet light produces a latent image which can be developed by heat treatment at 590°C. Covering of semiconductor devices with a protective layer of the glass stabilizes the physical properties of the devices, greatly increasing their service lives. References: 2 Russian.

6508/5915
CSO: 1841/359

UDC 546.65'763

X-RAY PHASE AND THERMOGRAVIMETRIC INVESTIGATION OF $La_{1-x}(Y)M''CrO_3$ ($M'' = Mg, Ca, Sr, Ba$) SYSTEMS

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 53, No 5, May 87 (manuscript received 25 Sep 85) pp 457-460

[Article by S. A. Nedilko and G. V. Panchenko, Kiev Institute]

[Abstract] $La_{1-x}(Y)M''CrO_3$ systems exhibit high electro- and heat-conductivity, resistance to oxidation and corrosion and good thermal stability. X-ray phase, thermogravimetric and chemical analyses were reported on the solid solution systems $La_{1-x}M''CrO_3$ and $Y_{1-x}M''CrO_3$, where $M'' = Mg, Ca, Sr$ and Ba . These compounds were obtained by coprecipitation of aqueous solutions of the respective

metal nitrates. Double chromites of rare and alkaline-earth metals behave like pure chromites of lanthanum and yttrium on heating. X-ray phase analysis showed that these compounds form solid solutions with all divalent metals. Chemical analysis supported findings obtained from x-ray phase analysis and agreed with the calculated values. Figure 1, references 13: 7 Russian, 6 Western.

7813/5915
CSO: 1841/403

UDC 541.133:546.4/5'121-14

SPECIFIC ELECTROCONDUCTIVITY OF FUSED BINARY MIXTURES OF MAGNESIUM, CALCIUM STRONTIUM AND BARIUM FLUORIDES

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 53, No 5, May 87
(manuscript received 25 Sep 85) pp 480-483

[Article by B. M. Voronin, V. D. Prisyazhnyy, K. K. Khizhnyak, V. N. Zamkov and Yu. K. Novikov, Institute of General and Inorganic Chemistry, UkSSR Academy of Sciences, Kiev]

[Abstract] Specific electroconductivity of fused binary mixtures was studied as a function of temperature and composition of the following specimens: Mg, Ca|F; Mg, Sr|F; Mg Ba|F; Ca Sr|F, Ca Ba|F and Sr|Ba F. Specific electroconductivity as a function of concentration differs significantly depending on whether the mixture includes magnesium fluoride. This is possible due to different size and polarizing power of Mg^{++} on one side and Ca^{++} , Sr^{++} and Ba^{++} ions on the other. These data can be used to optimize the composition of fluoride flux for electroslog processes, varying electric resistance of the slag tank in a wide range. Figure 1, references: 5 Russian.

7813/5915
CSO: 1841/403

UDC [546.65:546.824-31]:537.311.1

ELECTROMIGRATIONAL CHARACTERISTICS OF LANTHANOID DITITANATES IN HIGH TEMPERATURE RANGE

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 53, No 5, May 87
(manuscript received 29 Oct 85) pp 486-489

[Article by G. A. Teterin, I. M. Minayev, V. F. Zinchenko, A. V. Zagorodnyuk, Physical-Chemical Institute, UkSSR Academy of Sciences, Kiev]

[Abstract] Conductivity of lanthanoid dititanates was investigated in the temperature range 1000-1400°C where they act as ionic-electronic conductors with significant contribution of the ionic component to the conductivity. In

all cases, conductivity of complex oxides was lower than specific conductivities of pure components. The lowest values of electroconductivity were shown by La, Nd, Gd, Er and Lu dititanates, all of which showed predominantly ionic conductivity; the opposite was observed with Pr, Tb and Ho dititanates. Activation energy of the electronic component of conductivity was rather high for a number of dititanates. The ionic-electronic nature of their conductivity is rather complex, their component parameters depending on the metal-oxygen bond strength as well as on the lanthanoid coordination. Figure 1, references 16: 14 Russian (1 by Western author), 2 Western.

7813/5915
CSO: 1841/403

UDC 539.216+546.634+546.28

SYNTHESIS AND PROPERTIES OF FILMS BASED ON LANTHANUM AND SILICON OXIDES

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 53, No 4, Apr 87
(manuscript received 18 Jul 85) pp 339-341

[Article by N. A. Kostromina, Yu. B. Badayev and V. A. Kompaniyets, Institute of General and Inorganic Chemistry, UkSSR Academy of Sciences, Kiev]

[Abstract] Fine films made of rare-earth element oxides are used in electronic industry. Electrophysical properties of such films obtained by pulverization methods were investigated. These methods require complex equipment unsuitable for automation. Production of these films from solutions makes it possible to measure out precisely these components in solution and thus be much more applicable technologically. The goal of the present work was to obtain lanthanum and silicon oxide films from solutions and to evaluate their electrophysical properties. The films were formed on aluminum support by consecutive evaporation of mixed components from solutions. IR spectra of parent and mixed films were compared and their dielectric properties were determined. Introduction of La into the SiO_2 films increased specific capacity caused by high dielectric permeability. Figures 2, references 6: 5 Russian, 1 Western.

7813/5915
CSO: 1841/403

PROBLEM OF VALENCE OF NEPTUNIUM IN CHALCOGENIDES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 293, No 4, Apr 87
(manuscript received 8 May 86) pp 920-922

[Article by Academician V. I. Spitsyn and G. V. Ionova, Institute of Physical Chemistry, USSR Academy of Sciences, Moscow]

[Abstract] Neptunium forms a series of compounds with chalcogenides which are similar in structure to compounds of uranium, plutonium or the rare earths. The chalcogenides of the actinides usually have high electric conductivity. Determination of the valences of such compounds is a difficult problem. This article attempts to determine the values of P_f in neptunium chalcogenides and to analyze the change in valence of the neptunium atom as a function of coordination numbers, internuclear distances and compound structural type based on Mossbauer spectroscopy. The Mossbauer experiments show that the isomer shifts in the neptunium chalcogenides lie in the range of change of isomer shifts for NpF_3 and NpF_4 . The calculated populations of the 5f atomic orbital of the neptunium atom in the chalcogenides indicate that in a series of similar compounds with neptunium, the ionic nature of the bond decreases in the sequence from S to Te; the population of orbital 5f increases and its degree of oxidation decreases in the same sequence. Strong configuration mixing occurs in neptunium chalcogenides as a function of interatomic distance and coordination number. The gradual reduction in ionic nature of the Np-X bond leads to a gradual change in population, then a jump in valence. Figure 1, references 4: 2 Russian, 2 Western.

6508/5915
CSO: 1841/388

UDC 541.12.011.2

CALCULATION OF STRENGTH OF CERAMIC MATERIALS UNDER THERMAL LOADS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 293, No 4, Apr 87
(manuscript received 4 Jul 86) pp 928-932

[Article by V. Ya. Shevchenko, I. E. Smolyarenko and Academician N. M. Zhavoronkov, Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, USSR Academy of Sciences, Moscow]

[Abstract] Analysis of the process of failure of a ceramic exposed to thermal shock is a complex problem. This article analyzes the problem for a homogeneous rod at a uniform temperature, one end of which comes in contact with a medium having a higher temperature. The thermal loading is accompanied by propagation of elastic compressive waves through the rod. Equations are derived which can be used to estimate the thermal stability and its change with time and coordinate for various materials, including ceramics, in the process of thermal loading. References 4: 3 Russian, 1 Western.

6508/5915
CSO: 1841/388

DISTRIBUTION OF COMPONENTS IN ATOMIZED ALLOY FILMS AS A FUNCTION OF PHASE DIAGRAM TYPE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 293, No 6, Apr 87
(manuscript received 16 Jun 86) pp 1403-1406

[Article by K. N. Zhavoronkova, O. A. Boyeva, A. R. Vinogradov and V. I. Nefedov, Moscow Institute of Chemical Engineering imeni D. I. Mendeleev; Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, USSR Academy of Sciences, Moscow]

[Abstract] A study of variation of composition with depth, in films in rare-earth metal alloys with copper produced by atomization in a vacuum by x-ray electron spectroscopy in combination with ionic etching, indicated the possibility of using the method for qualitative determination of the form of liquid-vapor phase diagrams of binary metallic systems. The etching curve represents a "time scan" of the evaporation process. The process of evaporation of alloys is not an equilibrium process, so that the etching curves agree only qualitatively with evaporation curves, showing the variation of Cu/Dy [dysprosium] atomic ratio as a function of etching time. A thin surface layer is formed rich in Dy due to segregation resulting from the difference in heats of oxidation of Dy and Cu. The Dy interacts with the residual gas, serving as the motive force for its diffusion to the surface, so that the composition of the surface film is always that of an azeotrope. Figures 3, references: 2 Russian.

6508/5915
CSO: 1841/400

UDC 539.8

SACCHAROSE BEHAVIOR AT HIGH PRESSURE AND TEMPERATURE

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 4, Apr 87
(manuscript received 10 Apr 85) pp 1059-1062

[Article by M. D. Shalimov, L. F. Kulikova, V. N. Slesarev, Ye. N. Yakovlev and N. F. Borovikov, Institute of High Pressure Physics, USSR Academy of Sciences, Troitsk]

[Abstract] Studies of the effect of pressures on carbonization and graphitization processes showed that pressure accelerates them, lowering the temperature required for the process. The changes in saccharose occurring during the heating stages preceding diamond formation were investigated. Samples of saccharose compressed to 5.4.5 mm tablets were heated to temperatures ranging from 280 to 1350°C under 80 kBar pressure. Heating rate was 60° per sec. During the carbonization process, a supermolecular structure was formed. At

280° C, porous material was formed due to intensive gas evolution; at 790° C a quite-dense coke structure was obtained and, above 850° C, the graphitization intensified with temperature. It was concluded that heating saccharose under pressure leads to thermal destruction of the carbohydrate followed by intensive graphitization of the carbon material including the formation of highly ordered graphite. Evidently, formation of diamonds in this system is preceded by a metastable phase of carbon-graphite. Figre 1, references 9: 6 Russian, 3 Western.

7813/5915

CSO: 1841/383

UDC 541.124/128

CALCULATION OF BIMOLECULAR GAS PHASE REACTION RATE CONSTANTS BASED ON MOLECULAR CONSTANTS IN WIDE TEMPERATURE RANGE

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 4, Apr 87
(manuscript received 24 Apr 85) pp 878-892

[Article by V. B. Yevdokimov, Chemistry Faculty, Moscow State University
imeni M. V. Lomonosov]

[Abstract] Formation of hydrogen iodide from hydrogen and iodine was thoroughly investigated by Bodenstein some 100 years ago, followed by numerous other studies. In the present work, reaction rates were calculated for the same reactions using the methodology of field theory. The reactions $H_2 + I_2 = 2HI$, $H_2 + I = HI + H$ and $H + I_2 = HI + I$ were studied in a wide temperature range up to 25,000 K. A formula was derived for the rate constants which are physical constants characterizing the reactive molecules with high degree of accuracy; from these data it is possible to get equilibrium constants, heat of chemical reactions and energy of dissociation. Theoretically calculated values were in excellent agreement with experimentally obtained data. Figures 5, references 22: 13 Russian (4 by Western authors), 9 Western.

7813/5915
CSO: 1841/383

UDC 546.32-38:546.666-38:541.123.31

KHCOO-Er(HCOO)₃-H₂O SYSTEM AT 25 AND 50° C

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 32, No 5, May 87
(manuscript received 25 Sep 85) pp 1242-1247

[Article by Ye. V. Petrova (deceased) and S. M. Portnova]

[Abstract] The KHCOO-Er(HCOO)₃-H₂O system was investigated searching for new compounds with piezo-, pyro- and nonlinear optical properties. An equilibrium in this system at 25°C was reached in one month and at 50°C in two weeks. Isothermal solubility method showed that there were five compounds in this system: in addition to the starting Er(HCOO)₃·2H₂O and KHCOO, three new

compounds have formed $\text{KEr}(\text{HCOO})_4 \cdot \text{H}_2\text{O}$, $\text{K}_3\text{Er}(\text{HCOO})_6$ and $\text{K}_5\text{Er}(\text{HCOO})_8$. Concentration limits were established for their crystallizations at 25° and 50°C. All these compounds were found to dissolve incongruently. Figures 3, references 11: 10 Russian, 1 Western.

7813/5915

CSO: 1841/407

UDC 541.49:547.27

COORDINATION COMPOUNDS OF GALLIUM HALIDES WITH CROWN ETHERS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 293, No 3, Mar 87
(manuscript received 6 Jun 86) pp 617-619

[Article by M. G. Ivanov, S. D. Vashchenko, I. I. Kalinichenko, A. N. Vokhmyakov and A. S. Barybin, Urals Polytechnic Institute imeni S. M. Kirov, Sverdlovsk]

[Abstract] Macrocyclic polyethers have ionophoric properties and can influence the permeability of hematoorganic barriers for biologically-active substances. Since simple gallium (III) salts have high antitumor activity in experiments on animals and positive results have been obtained in testing of gallium nitrate and chloride in clinical studies, the authors synthesized and studied the anticancer effect of complexes of gallium with crown ethers. The structure of the compounds obtained under nonaqueous conditions can be represented as: $[\text{GaX}_2 \cdot \text{Q}][\text{GaX}_4]$ ($\text{X} = \text{Cl}, \text{Br}$; $\text{Q} = 15\text{-crown-5}$ and 18-crown-6), while the structure of the compounds produced under aqueous conditions can be represented as $[\text{GaCl}_2 \cdot 15\text{C5}]\text{Cl} \cdot \text{H}_2\text{O}$ and $[\text{H}_3\text{O} \cdot 18\text{C6}][\text{GaCl}_4]$. The antitumor studies showed that the biological effect depends both on the anion GaX_4^- and the cation $\text{GaX}_2 \cdot \text{Q}^+$ portions of the complex. The complexes were more active with respect to sarcoma 180, but less with respect to leucosis La than simple gallium salts. References 11: 5 Russian, 6 Western.

6508/5915
CSO: 1841/388

SYNTHESIS AND INVESTIGATION OF THERMAL DECOMPOSITION OF URANYL CARBOXYLATE COMPLEXES WITH ACETAMIDE

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 32, No 5, May 87
(manuscript received 11 May 86) pp 1180-1183

[Article by I. A. Yuranov, V. V. Kolesnik, K. M. Dunayeva and V. I. Spitsyn, Moscow State University imeni M. V. Lomonosov; Moscow Aviation Engineering Institute imeni K. E. Tsiolkovskiy]

[Abstract] Uranium carboxylates may be used in purification and regeneration of uranium because they are insoluble while in form of neutral complexes but dissolve in anionic forms. Because of their thermal instability, uranium carboxylates may be converted to oxides. In the present work, uranium formates, acetates and propionates complexed with acetamide were studied. Structures for these compounds were proposed on the basis of IR spectral analysis coupled with literature data. The following generalities were observed for their thermal breakdown: complex desolvation occurs completely down to anhydrous uranyl carboxylates, preceded by melting of these compounds; final stages of thermolysis correspond to thermal breakdown of $\text{UO}_2(\text{RCOO})_2$; in an inert medium the final products are U_3O_8 (uranyl formate) and UO_{2+x} (uranyl acetate and propionate); in air all of them yield UO_3 which at temperatures above 780 K convert to U_3O_8 . References 10: 7 Russian, 3 Western.

7813/5915
CSO: 1841/407

UDC 547.26'118

AMINOALKYLATION OF 2-SUBSTITUTED 4,5-BENZO-1,3,2-OXAZAPHOSPHOLANES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 57, No 3, Mar 87
(manuscript received 6 Jan 86) pp 496-499

[Article by S. A. Terenteva, M. A. Pudovik and A. N. Pudovik, Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Affiliate, USSR Academy of Sciences]

[Abstract] A study was made of the interaction of oxazaphospholanes with animals. It is found that 2-aldoxy (alkyl-, dialkylamino)-4,5-benzo-1,3,2-oxazaphospholanes react with animals at room temperature, in many cases with exothermic effect, yielding cyclical products with 3- and 5-coordinated phosphorus atoms. Depending on reaction conditions, products of N-or P-aminoalkylation are formed which in many cases can be converted into each other. References: 5 Russian.

6508/5915
CSO: 1841/358

UDC 547.26'118

PHOSPHORUS-CONTAINING CROWN ETHERS. PART 9. COMPLEX-FORMING CAPACITY OF 17-MEMBER PHOSPHORUS-CONTAINING CROWN ETHERS WITH RESPECT TO METALS OF SUBGROUPS IA AND IIA

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 57, No 3, Mar 87
(manuscript received 28 Feb 86) pp 671-675

[Article by A. A. Chaykovskaya, T. N. Kudrya and A. M. Pinchuk]

[Abstract] In order to determine the influence of the nature of the phosphorus fragment of 17-member crown ethers on their capability for bonding elements of subgroups IA and IIA, this article undertakes the first systematic study of the complex-forming properties of the macrocycles obtained by the authors in the previous sections of the work and newly synthesized crown ethers with Li, Na, K, Ca and Mg picrates, based on comparison of the values of stability constants of the complexes. It is demonstrated that cation selectivity of crown ethers of this type is determined by the dimension of the

macroring cavity. The nature of the phosphorus-containing group significantly influences complex-forming properties of these crown ethers. Macrocycles with P=S group in the ring form more stable complexes than P=O-containing ligands. Both the oxygen atom of the phosphorus-containing group and donor centers of the polyether ring take part in bonding of cations of subgroups IA and IIA. Figure 1, references: 17 Russian.

6508/5915
CSO: 1841/358

UDC 547.241

SYNTHESIS OF 2-OXO-2-ALKOXY-1,4,2-DIOXAPHOSPHOLANES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 57, No 3, Mar 87
(manuscript received 24 Jul 85) pp 706-707

[Article by Z. S. Novikova, I. L. Odinets and I. F. Lutsenko, Moscow State University imeni M. V. Lomonosov]

[Abstract] When functionally-substituted methylphosphonites (I) containing an electron-acceptor group at the α -carbon atom are interacted with a stoichiometric quantity of aliphatic aldehyde at room temperature without a solvent, the corresponding phosphoranes (II) are first formed, which, splitting off an alcohol molecule, are easily converted to ilides (III). The ilides (III) then enter a Wittig reaction, leading to the formation of 2-oxo-2-alkoxy-1,4,2-dioxaphospholanes (IV) and the corresponding unsaturated compounds. All reactions were performed in an atmosphere of dry argon. References 5: 3 Russian, 2 Western.

6508/5915
CSO: 1841/358

UDC 547.26'118

INFLUENCE OF SUBSTITUENTS IN AROMATIC RING ON SPECTRAL AND CHEMICAL PROPERTIES OF 5-ARYL- Δ^3 -1,3,4 λ^5 -OXAZAPHOSPHOLINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 57, No 4, Apr 87
(manuscript received 22 Jul 85) pp 893-901

[Article by R. I. Tarasova, T. V. Zykova, A. V. Ilyasov, V. V. Moskva, N. I. Sinitsyna, T. A. Dvoynishnikova, M. V. Alparova, K. M. Yenikeyev, I. E. Ismayev, F. Sh. Shagvaleev and R. L. Korshinov, Kazan Institute of Chemical Engineering imeni S. M. Kirov]

[Abstract] In order to study the influence of substituents on the formation and properties of cycloadducts in the reaction of 1,3-cycloattachment of aldehydes to isocyanate phosphites, new 2-oxo-5-aryl- Δ^3 -1,3,4 λ^5 -oxazaphospholines with ortho-, meta- and para- substituents in the aryl radical were

synthesized. The oxazaphospholines can be divided into two groups in terms of their spectral and physical-chemical properties. The first group includes compounds containing a substituent in the ortho position of the aryl fragment, while the second group includes the para- and meta-substituted analogs. Representatives of the first group are extremely hygroscopic and subject to rapid hydrolysis, while those in the second group show hydrolytic stability in air in the crystalline state and are retained unchanged for years. The ortho- and para-phenyl substituted oxazaphospholines can exist in various forms. The ortho-substituted analogs remain in the first stable form with polarized P=N bond. The para (meta)-substituted analog are in a metastable form in the crystalline state, while in solutions at temperatures above 0°C they convert to the stable form at a rate which varies with temperature. References: 10 Russian.

6508/5915
CSO: 1841/406

UDC 541.91:541.69:547.1'118:577.153

SYNTHESIS AND ANTICHOLINESTERASE ACTIVITY OF O-ALKYL-O-[N-(β -OXYETHYL)-PIPERIDYL] ALKYLTHIOPHOSPHONATES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 3, Mar 87 (manuscript received 12 Jul 85) pp 647-650

[Article by M. B. Gafurov, A. A. Abduvakhobov, G. M. Vayzburg, D. N. Dalimov, K. M. Zuparova, Ye. K. Balashova and N. N. Godovikov, Institute of Bioorganic Chemistry, Uzbek SSR Academy of Sciences, Tashkent; Institute of Heteroorganic Compounds, imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow]

[Abstract] In order to find active reversible cholinesterase inhibitors among organophosphorus compounds, a number of O-alkylthiophosphonic acids based on N- β -oxyethylpiperidine were synthesized and their anticholinesterase activity studied. The structure of the compounds synthesized was confirmed by IR and PMR spectroscopy. The anticholinesterase properties of the compounds synthesized were studied on acetylcholinesterase from human blood erythrocytes and butylcholinesterase from horse serum. All the organophosphorus compounds studied were competitive reversible inhibitors of both types of cholinesterase. The inhibitor activity depended essentially on the nature of the substituent at the phosphorus atom. An alkyl radical directly bound to the P atom, and bound to the P atom through an oxygen bridge, is adsorbed on the active center of ACE differently. The greater specificity of action of the P=S compounds with respect to both acetyl and butylcholinesterase is apparently related to the lower electronegativity of the S atom and the resultant greater role of Van der Waals forces with respect to the active center of the enzyme. References 9: 7 Russian, 2 Western.

6508/5915
CSO: 1841/356

SYNTHESIS OF CERTAIN ORGANOPHOSPHORUS DERIVATIVES OF LUPININE AND EPILUPININE
AND THEIR INTERACTION WITH CHOLINESTERASES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 3,
Mar 87 (manuscript received 12 Jul 85) pp 650-654

[Article by D. N. Dalimov, M. B. Gafurov, G. M. Vayzburg, A. A. Abduvakhobov
and N. N. Godovikov, Institute of Bioorganic Chemistry, Uzbek SSR Academy of
Sciences, Tashkent; Institute of Heteroorganic Compounds imeni A. N.
Nesmeyanov, USSR Academy of Sciences, Moscow]

[Abstract] The search for new highly selective insectoacaricides requires
the study of the variation of anticholinesterase activity of new compounds
with their structure. To find highly specific cholinesterase inhibitors, the
authors synthesized a number of organophosphorus derivatives of the alkaloids
lupinine (I) and epilupinine (II) and studied their anticholinesterase activ-
ity with respect to human erythrocyte anticholinesterase and horse serum butyl-
cholinesterase. The compounds synthesized were found to be reversible com-
petitive inhibitors of both types of cholinesterase studied. References 9:
7 Russian, 2 Western.

6508/5915
CSO: 1841/356

OUT OF TOWN SESSION OF SCIENTIFIC COUNCILS OF USSR ACADEMY OF SCIENCES,
STATE COMMISSION ON SCIENCE AND TECHNOLOGY AND ALL-UNION ORDER OF LENIN
ACADEMY OF AGRICULTURAL SCIENCES IMENI V. I. LENIN

Moscow AGROKHIMIYA in Russian No 4, Apr 87 pp 141-143

[Article by Ye. L. Krivov'yazov]

[Abstract] An out-of-town scientific session was held in Saratov 25-27 June 1986, involving the combined Scientific Council of the USSR Academy of Sciences "Scientific Principles of Chemization of Agriculture," the Scientific Council on Chemization of Agriculture of the State Commission on Science and Technology and the Council for Scientific-Procedural Management of Technologic Centers for Grain Crops of the Presidium of the All-Union Order of Lenin Academy of Agricultural Sciences. The session dealt with problems of effective utilization of chemical substances in intensive grain-crop management. More than 150 persons took part in the session. It was noted at the session that one means for achieving the USSR Food Program is the introduction of intensive crop technology, particularly for grain crops, requiring combined utilization of all modern means for chemization of agriculture. Topics discussed included: results of the use of intensive grain crop technologies in 1985; problems of expanded fertility of soils and intensification of grain farming; scientific principles of combined chemization in modern agriculture; requirements of agriculture for assortment and quality of mineral fertilizers in the future, and problems of utilization of nitrogen fertilizers in intensive farming technology; major trends in the development of the production of all types of mineral fertilizers during the 12th Five-Year Plan; the use of aviation for cultivation of grain crops; scientific and practical principles of the use of retardants on grain crops; problems of weed control; introduction of intensive grain technology in Saratov Oblast. During the 13th Five-Year Plan and up to the year 2000, the production of highly concentrated complex fertilizers will reach 90% of all fertilizer production, with a nutrient content of around 45%. Forms of phosphorus-containing fertilizers are to be greatly improved. By the 13th Five-Year Plan, fertilizers will be delivered only in granulated or large crystal forms with uniform particle size. The use of such fertilizers with pesticides and growth regulators will greatly increase agricultural yields. Basic trends in the development of pesticides during the 12th Five-Year Plan include increasing in the volume of production to 470,000 tons by 1990, primarily herbicides, insectoacaricides, fungicides and seed treatments. A number of systemic fungicides, herbicides and soil pest-control substances will be produced. More progressive forms will be developed, considering the needs of agriculture.

FUNGICIDAL ACTIVITY OF EXTRACT FROM TABAUMA GIOI. A. CHEV.

Riga KHIMIYA DREVESINY in Russian No 1, Jan-Feb 87
(manuscript received 13 May 86) pp 103-104

[Article by D. Kh. Tkhu, V. I. Roshchin, O. N. Malysheva and V. A. Solovyev,
Leningrad Wood-Engineering Academy imeni S. M. Kirov]

[Abstract] It was previously shown that the resistance of Tabauma Gioi. A. Chev. to fungus is due to ether-soluble substances whose fungicidal effect is significantly greater than the components of a water extract. The acid fraction of the extract had practically no effect on wood-damaging fungi, whereas neutral substances had high fungicidal activity. The neutral substances were chromatographed on a column with silica gel, isolating hydrocarbons, esters and 6 fractions of alcohols. The fungicidal effects of the fractions were tested, showing that the hydrocarbons stimulated the growth of fungus cultures, while the alcohols of fractions 2 and 5 had fungicidal activity. Fraction 2 is a crystalline substance, m.p. 103-104°C with a tertiary hydroxyl group and 4 methyl groups, one of which is secondary, ledol II. Fraction 5 is indicated by TLC to contain 8 components, but was not further analyzed. References: 4 Russian.

6508/5915
CSO: 1841/349

UDC 661.723-13

STUDY OF FIRE-SAFETY PROPERTIES OF LIQUEFIED PETROLEUM GASES

Kiev KHIMICHESKAYA TEKHNLOGIYA in Russian No 2, Mar-Apr 87
(manuscript received 7 Jan 86) pp 77-79

[Article by V. P. Podgaynyy and N. I. Kopylnyy]

[Abstract] A study was made of the process of evaporation and combustion of liquefied petroleum gas (LPG) with a free surface and the nature of its interaction with water-foam and powder firefighting substances. Experiments were performed in an open test area with surrounding air temperature 30°C, wind speed 1-2 m/sec. Liquefied ethylene and propylene were used in the studies, taken from reservoirs with temperatures of -104 and 57°C, respectively. The intensity of evaporation of LPG was found to depend greatly on temperature of wall surfaces and the underlying surface in contact with the liquefied product. Intensity of combustion changes nearly-exponentially with increasing combustion area. Water is ineffective in extinguishing the fire. A mechanical foam instantly freezes on the surface and the gas-air mixture continues to burn above the foam. Powders based on sodium bicarbonate, potassium chloride, ammonium phosphate, potash and urea melt are quite effective in extinguishing the fire. Figures 4, references: 2 Russian.

6508/5915
CSO: 1841/346

SIGNIFICANCE OF CHEMOMOTOLOGY AND TRIBOTECHNOLOGY IN CREATION OF MODERN LUBRICATING MATERIALS AND DECREASING WEAR OF METAL PRODUCTS

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 4, Apr 87 pp 2-6

[Article by Ye. D. Radchenko and Yu. N. Shekhter, All-Union Scientific Research Institute of the Petroleum Industry]

[Abstract] Chemomotology, the theory and practice of efficient utilization of fuels and lubricants in technology, and tribotechnology, the study of friction processes in technology, differ significantly, in spite of the common problems which they frequently study. Chemomotology studies primarily petroleum products and their components, the mechanism of action of fuel and lubricants,

as well as oil-soluble surfactants and optimized synthesis of petroleum products. Tribotechnology studies processes involved in and means of reducing friction and wear in mechanisms of all types. Both of these sciences are profoundly involved in comprehensive studies to reduce the cost of friction and wear to the economy, including deepening our knowledge concerning the mechanism of action and quality of petroleum products, development of organic, colloidal and physical chemistry of petroleum products, the theory of surfactants, phase and contact interactions, the study of corrosion and protection of metals, reduction of friction and wear and active utilization of the mathematical apparatus for the solution of the practical problems created for the economy by corrosion and wear. A major factor in corrosion and wear in the Soviet Union is the psychological factor: failure of operating personnel to follow regulations, rules, instructions and state standards governing the storage and operation of equipment and proper utilization of petroleum products. The resolutions of the 27th CPSU Congress were directed primarily toward improving the human factor and strengthening discipline in all areas of the economy. Figures 2, references: 24 Russian.

6508/5915
CSO: 1841/354

UDC 662.753.11

EFFECTIVENESS OF ZEOLITE-BASED CATALYSTS IN CONVERSION OF METHANOL

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 4, Apr 87 pp 17-19

[Article by L. D. Konovalchikov, Ye. D. Radchenko, B. K. Nefedov and N. N. Rostanin, All-Union Scientific Research Institute of the Petroleum Industry]

[Abstract] One of the most effective methods of processing coal into motor fuel or raw materials for petrochemistry is gasification of the coal, producing CO and H_2 , with subsequent synthesis of methanol, followed by catalytic conversion of the methanol on high-silica zeolites type ZSM to produce hydrocarbons. This article presents results of experimental studies of the catalytic properties of domestic high-silica zeolites in the reaction of conversion of methanol to high-octane motor fuel components. Laboratory specimens of catalysts were obtained by granulation of hydrogen forms of zeolites with 50% $\gamma-Al_2O_3$ and tested on a pilot installation with a stationary catalyst bed, modeling the two-stage "Mobil Oil" methanol conversion process. The group hydrocarbon composition of the liquid products of the process were found to be the same on both fresh and regenerated catalysts, indicating full recovery of the properties of the catalysts after oxidative regeneration. Domestic type TsVM and TsVK zeolites were found to have high activity in conversion of methanol to hydrocarbons, but were rapidly deactivated due to intensive formation of coke. Modification of industrial TsVM zeolite provides for at least 97.5% conversion of methanol (by mass) over 580 hours and 75-78% selectivity with respect to liquid hydrocarbons. Oxidative regeneration of the catalyst was effective. The octane characteristics of the fuels produced were also retained, yielding 92-93 research octane (80-82 motor octane). Figures 2, references: 4 Russian.

6508/5915
CSO: 1841/354

DETERMINATION OF NATIONAL ECONOMIC EFFECT OF INTRODUCTION OF NEW UNIQUE PETROLEUM PRODUCTS

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 4, Apr 87 pp 30-31

[Article by I. Z. Esterlis and L. M. Noreyko]

[Abstract] In determining the economic effectiveness of new technology, the previously existing technology is used as the basis for comparison. In the case of products which have no previous analog, the economic effectiveness is to be determined by the increase in profit for the manufacturing enterprise. This formula does not consider the economic effectiveness in the sphere of consumption, reflecting only the economic effect on the manufacturer. The authors suggest a new equation for determination of the economic effectiveness of new products without previous analogs, considering the effect on both producers and consumers of the new products.

6508/5915

CSO: 1841/354

SPECIALIZATION OF INSTITUTES AND RESULTS OF ALL-UNION COORDINATION CONFERENCE ON FERROUS METALLURGY RESEARCH AND EXPERIMENTAL-DESIGN WORK IN AREA OF COKE CHEMISTRY

Moscow KOKS I KHIMIYA in Russian No 4, Apr 87 pp 57-59

[Article by M. I. Rudkevich, M. P. Tselik and T. V. Belkina, Research Institute of Coal Chemistry]

[Abstract] Specialization of scientific-research institutes in ferrous metallurgy for the 12th Five-Year Plan period has been approved. The central institute of the branch is the Central Scientific Research Institute of Ferrous Metallurgy imeni I. P. Bardin. The Institute of Coal Chemistry and All-Union Institute of Coal Chemistry are responsible for complex scientific research in the area of coke-chemical production. The Institute of Coal Chemistry is the head institute in the area of "technology of production of blast furnace coke and methods of evaluating its quality." The All-Union Institute of Coal Chemistry is the head institute for "preparation of coal for coking. Processing of coke gas." Both institutes are to provide coordination, scientific-technical and economic consultation, monitoring the performance of scientific research and development of organizational work in accordance with the coordination plan in their areas. An All-Union Coordination Conference was held in Donetsk in July of last year, analyzing and discussing plans for scientific research and experimental-design work for 1987-1988 in the area of coke chemistry. Results of production in the industry were reviewed, as well as plans

for scientific research and development. The scientific research plan for 1987-1988 calls for the solution of problems related to the manufacture of new technology, progressive technical solutions for the future, improvement of traditional processes and technologies. Studies will be undertaken in the area of complex purification of coke gas and improvement of the quality of end products.

6508/5915
CSO: 1841/351

USE OF FULLY INDEPENDENT FINANCING AND COST ACCOUNTING IN OIL REFINING AND PETROCHEMICAL INDUSTRY

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 5, May 87 pp 2-9

[Article by G. V. Zhuk, Chief, Financial Administration, Ministry of the Petrochemical Industry, USSR]

[Abstract] The continuing increased demand for fuel and petroleum products, with the decreasing pace of new discovery, means that new methods must be found to evaluate the output of refineries and petrochemical plants, based on finished product and profit rather than overall production scale. Calculation of profitability and amortization must include capital cost of the enterprise. Enterprises in the industry must be converted immediately to total self financing, bypassing the transition stage used in other industries and utilizing the unique new characteristic of finished product output. The transition to full cost accounting and self financing will encompass all spheres of activity of enterprises, requiring in-depth and comprehensive analysis of economic activity, restructuring of the entire ideology of planning and financial stimulus. The transition requires preservation of the existing mechanism of centralized planning and distribution of production funds. It is not sufficient to have sources of money. Investment funding and limits on material resources are also required. The wage fund must be directly dependent on income of an enterprise, based on finished production, which is determined by excluding from overall output the material costs for production and amortization, adding or subtracting the increase or decrease in product cost resulting from changes of prices and tariffs in the plan. The analysis of the direction of restructuring of the economic mechanism shows that increasing the strength of the plan involves not an increase in the number of directive indicators regulating the activity of an enterprise, but rather an increase in the quality and effectiveness of planned administration of the economy, requiring a basic conversion of the self-financing subsystem of the economic mechanism, intended to resolve some of the contradictions in socialist economics which accumulated in the 1970's and hindered the conversion of expanded production to intensive paths of development.

6508/5915
CSO: 1841/402

FUTURE OF KATEK (KANSKO-ACHINSK TERRITORIAL ENERGY COMPLEX) AS COAL SOURCE

Moscow KHIMIYA I ZHIZN in Russian No 4, Apr 87 pp 2-7

[Article by A. M. Kutepov]

[Abstract] Some of the plans for the years 1986-2000 call for increased production of coal by more efficient labor and further development of Kuznetsk, Ekibastuz, Kansk-Achinsk and coal basins of Eastern Siberia. In the future, coal will have to replace oil and gas. About 80% of all known coal reserves are in Siberia. The depth and thickness of the coal deposit make the mining easy even in open pits. Projections have been made that 1600 tons of coal will be mined each month per individual miner. The coal has its disadvantages as well: high moisture content, low caloric output, dust and spontaneous combustion in dry state. Therefore it should be used locally. An ambitious program is sketched for processing of this coal into energy, chemicals, synfuel, etc. The principal problem with these projects is their sheer size. The massive volume of coal to be processed will require new concepts, new machinery and new technological solutions of yet unforeseen problems. Environmental protection is another underlying principle which will present additional technical problems, especially since water reserves are scarce in this area. The project is unique and without any precedence. It could bring fantastic economic gains surpassing all imagination.

7813/5915

CSO: 1841/345

UDC 541.49

METAL-CONTAINING POLYIMIDE MATERIALS

Kiev KHIMICHESKAYA TEKHOLOGIYA in Russian No 2, Mar-Apr 87
(manuscript received 12 Jul 86) pp 32-36

[Article by M. T. Bryk and Ye. Ye. Danilenko, Institute of Colloid Chemistry and Water Chemistry, UkSSR Academy of Sciences, Kiev]

[Abstract] A study was made of complex formation of transition metal ions--copper (II), cobalt (II), nickel (II) and iron (III)--with N-phenylphthalamidic acid (PPA). Two basically new methods were developed for producing metal-containing polyimide composites, based on a combination of the thermal method of producing metal polymers by decomposition of organic compounds such as formates in the presence of polymers and thermal cyclization of PAA. Decomposition results in the formation of colloidal particles of metals having highly developed surfaces, which favors their interaction with polymer macromolecules. Complex formation, beginning in the dimethylformamide solutions of PAA, continues in the solid phase. The thermal stability of the metal-containing polyimide composites depends on the thermal stability of the complexes formed, nature of the metal and method of its production. Figures 3, references: 17 Russian.

6508/5915
CSO: 1841/346

UDC 541.141

EFFECT OF ACRYLAMIDE ON DIFFRACTION EFFECTIVENESS OF HOLOGRAMS BASED ON GELATIN

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 53, No 5, May 87
(manuscript received 17 Sep 85) pp 494-497

[Article by S. V. Volkov, A. V. Botsman and A. R. Shevchenko, Institute of General and Inorganic Chemistry, UkSSR Academy of Sciences, Kiev]

[Abstract] Effect of acrylamide content in gelatin films on diffraction effectiveness of holograms formed in this system was studied. Saturation of these films by the monomer occurred at different times for different concentrations, keeping the temperature constant; as a rule, film saturation occurred

faster in more-concentrated solutions. Photopolymerization was shown to be a function of the qualitative composition of the system, as illustrated by diffraction effectiveness representing the degree of structural conversions in the polymer matrix of gelatin. Figures 3, references 10: 9 Russian (2 by Western authors), 1 Western.

7813/5915
CSO: 1841/403

UDC 678.4.027:678,4.028.2+678.4.057:678.4.058

FORMATION AND VULCANIZATION OF VERY LARGE TIRES USING NEW PROCESS EQUIPMENT

Moscow KAUCHUK I REZINA in Russian No 3, Mar 87 pp 26-28

[Article by M. I. Sverdel, V. A. Zayka and V. P. Zakopay]

[Abstract] A study is reported of the specifics of formation and vulcanization of very-large-format tires on diaphragm units, noting the advantages and disadvantages of individual elements of the equipment considering the experience which has been gained in its utilization. Formation is performed in three stages using compressed air fed into a diaphragm cavity. The third stage of formation is completed with an aperture of the sides in the blank 10-15% greater than the aperture angle of the sides of the vulcanized product, decreasing the spreading force on the diaphragm unit support during storage of the formed tires, reducing the required metal consumption of the machine by 10%. All operations related to closing and opening the diaphragm units are performed manually with special tools. Single-position vulcanizers are used for very large tires, with the cover of the vulcanizer controlled by special hydraulic cylinders. Instruments are used to measure the pressure and temperature in the vulcanizer. Vulcanization continues up to 700-900 minutes at 180-190°C. The process yields high quality tires, requiring less labor than foreign competitive equipment. Figures 3, references: 3 Russian.

6508/5915
CSO: 1841/368

UDC 678.061.003.12

USE OF GENERALIZED RANK INDEX IN COMPARING QUALITY OF PRODUCTS OF FOAM RUBBER PRODUCED BY VARIOUS PLANTS

Moscow KAUCHUK I REZINA in Russian No 3, Mar 87 pp 42-43

[Article by N. Ye. Dubrovina, M. V. Rogova, G. R. Mazina and D. P. Trofimovich]

[Abstract] A new method has been developed for comparing foam-rubber products from different plants. The method involves calculating a generalized rank index by a simple mathematical method. The value of each partial rank-index

is established by comparing the mean values of physical and mechanical characteristics of the products and the degree of their dispersion. The method was used to evaluate the quality of foam-rubber products produced in 1984. Figure 1, references: 2 Russian.

6508/5915

CSO: 1841/368

POLYMER ROLLED PRODUCTS

Moscow KHIMIYA I ZHIZN in Russian No 5, May 87 pp 28-29

[Article by M. Mylina, Press Center, USSR Chemical Industry Ministry]

[Abstract] Automatic continuous plastic casting lines developed at "Polimerbyt" Scientific-Production Association with the cooperation of "Kriogenmash" Production Association and the All-Union Scientific Research Institute of Metal Working Machinery are described. A heated piston forces melted polymer from an extruder into a crystallizer containing a start-up profile. The piston moves back and forth, the portion of melt fed by the piston on each cycle filling the space between the piston and the start-up shape and solidifying to form a layer, after which a pusher moves the polymer bar toward the output of the unit, then the piston inserts another portion of melted polymer. The repetition frequency of the cycle is selected so that the growth of the part on the hot end is practically continuous, with each additional layer welded to the previous layer before it has completely cooled. This technology produces very homogeneous parts of any desired size with dimensional accuracy provided by subsequent mechanical working on automatic machines. The new lines are 5 times more productive than previous methods, consuming 1/3 as much water and 1/4 as much electric power per unit of product. Five such lines, now in operation, have yielded a 10-million-ruble economic effect during the past Five-Year Plan. Figure 1.

6508/5915

CSO: 1841/402

UDC 678.01:539

INFLUENCE OF CHEMICAL STRUCTURE ON PROPERTIES OF POLYMERS AND PLASTIC FOAM AT TEMPERATURES BELOW GLASS POINT

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR in Russian No 4, Apr 87
(manuscript received 15 May 86) pp 106-125

[Article by I. V. Gruzinsh and A. F. Alksnis, Order of Labor Red Banner Institute of Wood Chemistry, Latvian SSR Academy of Sciences]

[Abstract] This is a review of a method which has been suggested for estimating the suitability of a polymer material for use at very low temperatures by computing the density of the work of deformation to rupture at 4.2 K. The higher

the density of the work of deformation to rupture, the greater the failure elongation and strength of the polymer at cryotemperatures. Testing of polymers at low temperatures may yield a distorted picture of the physical and chemical properties of the polymers due to the strong influence on these properties of adsorbed molecules of the gas used to cool the specimens tested. Two methods are suggested for developing the composition of polymer materials suitable for use at low temperatures in adhesive joints with aluminum: the use of fillers and reinforcing materials in quantities sufficient to decrease the coefficient of thermal expansion; and modification of the chemical structure of the polymer to introduce fragments to the macromolecule giving the polymer elasticity at low temperature. The second method is considered more promising. Studies have shown that the free volume in a polymer material at temperatures below its glass point correlates well with the capability of the polymer material for deformation at very low temperatures. The most reliable and simplest method of testing the suitability of a polymer or plastic foam material for low temperature use is to test the usage properties of the material on models. It is possible to predict the behavior of polymer materials at low temperatures on the basis of the chemical structure of the macromolecular chains of the polymer. Chemical structures should be sought providing a broad relaxation spectrum of the polymer in the low temperature interval. The polymer materials should consist of low-flexibility macromolecules, should have optimal density of the polymer grid and the most dense possible packing of macromolecules at temperatures below the glass point of the polymer. References 48: 23 Russian, 25 Western.

6508/5915
CSO: 1841/402

UDC 541.15.02

STRUCTURAL CHANGES IN IRRADIATED POLYETHYLENE

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 4, Apr 87
(manuscript received 17 Jun 86) pp 1124-1127

[Article by O. V. Prokopyev, G. M. Plavnik, G. N. Troshkin and V. V. Gromov,
Institute of Physical Chemistry, USSR Academy of Sciences, Moscow]

[Abstract] Structural changes in low density polyethylene (LDPE) exposed to radiation were investigated. It was shown that diffraction spectra of irradiated samples exhibited stage-wise changes. This is due to crosslinking of polyethylene which takes place during this process: in the first stage they occur in amorphous regions involving only peripheral segments of the crystallites. With increased dosage of absorbed radiation, the crosslinking shifts deeper into the center of crystallites resulting in structural changes leading to amorphous state of the crystalline phase. At a dose of 10 MGy the samples convert to a roentgenoamorphous state. Figures 3, references 7: 4 Russian, 3 Western.

7813/5915
CSO: 1841/383

EXPOSED BY CHERNOBYL

Moscow KHIMIYA I ZHIZN in Russian No 4, Apr 87 pp 8-17

[Article by V. Stantso]

[Abstract] An interview is reported with Academician V. A. Legasov, Deputy Director of the Institute of Nuclear Energy imeni I. V. Kurchatov, about some of the consequences of Chernobyl accident. The first problem was a lack of simple color-sensitive radiation detectors. There were many foci of extremely high radiation which could not even be measured by the available instruments. The next problem was the control of burning graphite, for which there was no experience at all to fall back on. Boron was used to capture neutrons, proper cement needed to be mixed to set at the right time, logistical problems had to be solved just to deliver this material to the proper locations, radio-chemical dust had to be localized, novel polymers used for this purpose had to be synthesized practically on site. The well known chronology of events leading to the disaster is recounted and the situation compared to the Bhopal accident in 1984. Radioactive isotopes were analyzed in their contribution to the overall danger. Figures 6.

7813/5915

CSO: 1841/345

UDC 546.661:542.61:541.49

INFLUENCE OF CERTAIN TETRAVALENT ELEMENTS OF EXTRACTION OF EUROPIUM INTO DI-2-ETHYLHEXYLPHOSPHORIC ACID

Leningrad RADIOKHIMIYA in Russian Vol 29, No 2, Mar-Apr 87
(manuscript received 12 Jun 85) pp 177-180

[Article by A. V. Afanasyev, O. A. Sinegribova, S. V. Shmidt and G. A. Yagodin]

[Abstract] The use of organophosphorus acids in processing of spent nuclear fuel is complicated by the formation of compounds with a number of elements which can increase the extraction of other components, thus influencing the uranium and plutonium purification factors. This phenomenon is not observed for tetravalent thorium and uranium, but does occur in the presence of

zirconium, hafnium and titanium. The present work has studied other tetravalent elements such as plutonium (IV), one of the most valuable components of reactor fuel, and its analog cerium (IV) to discover if there is a similar reinforcing effect on the extraction of europium by di-2-ethylhexylphosphoric acid. It was found that an increase in the content of plutonium (IV) and cerium (IV) in di-2-ethylhexylphosphoric acid decreases the extraction of europium from nitrous-acid media. The curve of $B_{Pu} (IV) = f (C_{Zr}^{org})$ passes through a maximum at $Zr: HA=1: 23$. In this case a mixed Pu^{4+} - di-2-ethylhexylphosphoric acid - Zr^{4+} complex is probably formed, and the difficulty of extraction of plutonium from zirconium may be caused by increased extraction of plutonium in the complex acid H_2ZrA_6 . Figures 4, references 14: 13 Russian, 1 Western.

6508/5915
CSO: 1841/401

UDC 546.296:539.219.3(546.643-31)

DIFFUSION OF RADON-220 IN YTTRIUM OXIDE

Leningrad RADIOKHIMIYA in Russian Vol 29, No 2, Mar-Apr 87
(manuscript received 28 Dec 85; in final form 1 Jul 86) pp 220-227

[Article by I. N. Bekman, T. I. Shcherbak and A. A. Shvyryayev]

[Abstract] Yttrium oxide is used in various areas of new technology, particularly nuclear power engineering, as an additive to fuel elements and a structural material for nuclear reactors. This article determines the diffusion coefficients of radon-220 in a polycrystalline specimen of Y_2O_3 powder by emanation-thermal analysis. Primary attention is given to the development of a mathematical model of the diffusion process of radon and comparison of the measured temperature dependence of the diffusion coefficient with the calculated values. Statistical analysis showed that from the standpoint of experimental error, two hypotheses are possible relative to the temperature variation of concentration of low-temperature complexes. However, one version is considered physically more probable. It is concluded that the diffusion of ^{220}Rn in Y_2O_3 at temperatures up to about 1220 K occurs through easily mobile complexes with the participation of O''_1 , at temperatures over 1470 K through complexes involving V'''_Y , with both mechanism occurring in the intermediate temperature range. Figures 2, references 14: 6 Russian, 8 Western.

6508/5915
CSO: 1841/401

INORGANIC LIQUID AQUEOUS SCINTILLATOR

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 293, No 2, Mar 87
(manuscript received 11 Apr 86) pp 406-408

[Article by G. L. Sharipov, V. P. Kazakov and G. A. Tolstikov, corresponding member, Institute of Chemistry, Bashkir Affiliate, USSR Academy of Sciences, Ufa]

[Abstract] Studying the radioluminescence of aqueous lanthanide solutions, the authors concluded that direct excitation of the activator by radiation or other mechanisms not involving energy transfer from the solvent could yield significant radiation output. The intensity of radioluminescence of a solution of terbium in V_2O was found to be greater than that of a dioxane scintillator or a solution of p-terphenyl in toluene. Solutions of Tb 2-2.5 mol/l in D_2O , H_2O , 0-30% HCl , HNO_3 and $HClO_4$ are recommended as scintillators for recording of α radiation. These inorganic solutions are little sensitive to low-energy β particles. This new type of scintillator is a "single-electron" substance, utilizing the principle of direct action of radiation on the activator, previously considered unpromising. Figures 2, references 8: 6 Russian, 2 Western.

6508/5915
CSO: 1840/400

UDC 533.9.539.12.04:621.039.616:539.9.082:621.039.351

RADIATION BLISTERING CONSIDERING OVERFILLING OF SURFACE LAYERS OF STRUCTURAL MATERIALS

Moscow POVERKHNOST: FIZIKA, KHIMIYA, MEKHANIKA in Russian No 5, May 87
(manuscript received 7 May 86) pp 111-116

[Article by M. I. Guseva, S. M. Ivanov and A. N. Mansurova]

[Abstract] Results are presented from a study of radiation blistering of nickel under the influence of helium ions with energy 20 keV with simultaneous and preliminary atomization onto the target of a film of the same material. Specimens were prepared of nickel foil 500-1000 μm thick, produced by repeated rolling with intermediate annealing at 850°C for 30 minutes, final annealing 850°C, 1 hour. All experiments were performed with an ion flux density of 15 $\mu A/cm^2$. The topology of the surface of the specimens was practically the same with or without the atomized film. With simultaneous atomization of the film and insertion of He^+ ions, as dose increased the sponge structure observed otherwise was not formed, but continuous blister formation occurred, not leading to significant surface erosion. Atomization thus stops the development of

blistering due to the expansion of the helium-capture area. The regularities of blister formation with atomized atoms on the surface of the material may differ from that observed here, since in thermonuclear reactions the composition of the atomized film may differ significantly from the composition of the material of the initial wall. Figures 5, references 22: 16 Russian, 6 Western.

6508/5915
CSO: 1841/409

UDC 539.12

DECELERATION OF FAST CHARGED PARTICLES IN SURFACE LAYERS OF MULTICOMPONENT MATERIALS AND FORMATION OF PRIMARY RADIATION DEFECTS UPON ION BOMBARDMENT

Moscow POVERKHNOST: FIZIKA, KHIMIYA, MEKHANIKA in Russian No 5, May 87
(manuscript received 26 Aug 86) pp 121-132

[Article by Yu. D. Lizunov and A. I. Ryazanov]

[Abstract] A study is reported of the deceleration of fast charged particles and primary radiation-induced damage is determined in multicomponent targets, using a method based on numerical solution of the Boltzman equations for moving ions and atoms of the bombarded material. This allows correct consideration of the influence of the target surface and computation of the deceleration of charged particles in materials with quite arbitrary interaction potential. The method allows effective investigation of deceleration of ions and the radiation damage they produce by a single method in both single-component and multicomponent materials. The advantages of the method are particularly great in the area of relatively low energy, where the profiles of the particles decelerated are located in the immediate vicinity of the boundary and it is important to consider the influence of the surface. Figures 6, references 14: 4 Russian, 10 Western.

6508/5915
CSO: 1841/409

UDC 634.0.811

STUDY OF PROCESS OF DELIGNIFICATION OF WOOD WITH POLYMER-FILLED CAPILLARY PORE SYSTEM. PART 1. INFLUENCE OF CONDITIONS OF SATURATION OF WOOD FIBER WITH MONOMER ON DEGREE OF ITS PORE FILLING AND LOCALIZATION OF POLYMER

Riga KHIMIYA DREVESINY in Russian No 1, Jan-Feb 87
(manuscript received 10 Nov 85) pp 21-26

[Article by V. Ya. Klevinskaya, A. P. Treymanis and V. S. Gromov, Institute of Wood Chemistry, Latvian SSR Academy of Sciences]

[Abstract] A study is presented of the possibilities and specifics of delignification of wood with filled cell lumens, one method of inhibiting cooking processes in the secondary shell and intensification of the processes in the area of the complex central plate. The capillary pore system of the wood was filled with synthetic polystyrene, resistant to the effects of the reagents present. Practically complete closure of the paths of diffusion of the reagents and dissolved cell wall components through the lumens was achieved and confirmed by photomicrographs obtained on optical and scanning electron microscopes. The polymer is seen in the pictures to be in contact with the inner morphological layers of the cell envelopes of the wood. Figures 3, references 17: 11 Russian, 6 Western.

6508/5915
CSO: 1841/349

UDC 676.16.014:541.15

EFFECT OF RADIATION DESTRUCTION OF PULP ON PAPER PROPERTIES

Riga KHIMIYA DREVESINY in Russian No 2, Mar-Apr 87
(manuscript received 26 Sep 85, after final revision 6 Mar 86) pp 38-43

[Article by V. A. Polushkin, V. A. Diner, L. I. Avanesova and M. V. Frolov, Central Scientific Research Institute of Paper]

[Abstract] Introduction of gamma ray sterilization of cellulose materials designed for medical application stimulated this work as literature data on this subject are limited, especially linking this process to the properties of paper. Cellulose destruction was judged by the degree of polymerization and

evidence of oxidative processes taking place. In the dose range of 5 to 200 kGy, air irradiation changed the strength of cellulose fibers as well as their interactions resulting in a direct effect on the paper strength. A very sharp drop in dry paper strength occurs with lower degree of polymerization of cellulose. Cellulose hydrophobization was also noted which led to greater wet paper strength. Amounts of resinous substances, the cellulose "satellites" decrease due to irradiation in the range of 25-50 kGy. These resinous materials play a role in the wet strength of the paper; further investigation of this aspect is recommended. Figures 6, references 9: 7 Russian, 2 Western.

7813/5915
CSO: 1841/404

UDC 634.0.813.6:547.538.141

PATTERNS IN PERMEABILITY OF WOOD AND KINETICS OF ITS IMPREGNATION WITH STYRENE

Riga KHIMIYA DREVESINY in Russian No 2, Mar-Apr 87
(manuscript received 7 Jan 86) pp 95-101

[Article by M. V. Grinberg and Yu. A. Zoldners, Institute of Wood Chemistry, LaSSR Academy of Sciences]

[Abstract] The goal of this work was to investigate permeability of birch and alder during their impregnation with styrene as a function of wood density, drop in pressure, length of sample and stream direction in respect to the fiber direction in wood sample; also, kinetics of birch impregnation with styrene was investigated. Empirical relationships were found which could be described by the first and second order polynomials. The coefficient of wood permeability by styrene down the fiber length is about two orders of magnitude greater than across the fiber direction. When excess pressure was used, the degree of impregnation was proportional to square root of the exposure time; impregnation at atmospheric pressure showed proportionality to exposure time only during the initial stages of the process. On the basis of these data, it appears to be possible to develop prognostic indices for determining the degree of wood impregnation with styrene at preselected conditions. Figures 9, references 10: 5 Russian, 5 Western.

7813/5915
CSO: 1841/404

CONVERSION OF RAW PLANT MATERIAL DURING MILLING IN WATER STEAM MEDIUM.
1 COMMUNICATION. STUDY GOALS AND DESCRIPTION OF EXPERIMENTAL SETTING

Riga KHIMIYA DREVESINY in Russian No 2, Mar-Apr 87
(manuscript received 9 Jan 86) pp 102-104

[Article by N. A. Zhukov, A. S. Russkikh, V. V. Korotkov and A. P. Vladimirskiy
Kirov Polytechnic Institute, Sevgiprobiosintez]

[Abstract] One of the novel approaches to development of equipment for acid hydrolysis of forest biomass, as a means for increasing the animal feed resources, was developed by the French Company "Technip" under licence to Canadian Company "R&D Stake Technology Ltd." which is based on the principle of "steam explosion". A similar process for increasing sugar content can be realized using hot milling equipment modified by acid hydrolysis of the pulp. This approach presents several problems: corrosion of equipment, excessive requirements for electric power and absence of data on the kinetics of hydrolysis. To study the latter, a special apparatus was constructed, the principal link of which is a 10 liter milling chamber. After the milling operation, gas, liquid and solid components are collected and analyzed. The anticipated factors which could affect the composition of the hydrolysis products are: type of plants, catalysts and their consumption, temperature and duration of steam exposure and duration of the milling itself. Figures 2, references: 7 Russian.

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THIRD ALL-UNION CONFERENCE ON LOW TEMPERATURE CHEMISTRY

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 4, Apr 87 pp 1144-1145

[Article by I. A. Leyenson]

[Abstract] The Third All-Union Scientific Conference on the Chemistry of Low Temperatures was held in Moscow in December 1985. Over 200 specialists from various USSR cities attended it. Following were the themes of plenary sessions: theoretical concepts of low temperature reaction mechanisms; kinetics and the mechanism of chemical reactions of low temperatures; low temperature synthesis; experimental methods of low temperature chemistry; use of low temperatures in chemistry, biochemistry and chemical technology. These presentations were published in form of extended abstracts. Considerable attention was paid to theoretical aspects of cryochemistry. At low temperatures, information may be obtained not available at higher levels. There are two general directions of such studies: reactions in solutions usually over 220-200 K and syntheses using atomic metals (evaporation of a mixture of metals followed by precipitation on a cold surface). Use of spectroscopic methods at low temperatures was covered. The matrix isolation method was used to get unique information on intermediate and unstable compounds: free radicals, carbenes, carbon-silicon double-bonded compounds, etc. Use of cryochemistry in production of ferrites, ceramics and solid electrolytes was covered as these compounds cannot be obtained in any other way. The Fourth Conference on this topic is planned for 1988 to be held again in Moscow.

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QUANTUM CHEMICAL EVALUATION OF BIOLOGICAL ACTIVITY AND ALKALINITY OF AMINO-SUBSTITUTED ACRIDINES

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 61, No 4, Apr 87
(manuscript received 2 Jun 86) pp 1104-1106

[Article by V. F. Pedash and A. N. Gaydukevich, Kharkov Pharmaceutical Institute]

[Abstract] Quantum-chemical methods can be used for development of a relationship between electronic structure, physical-chemical properties and biological activity of large molecules. On the basis of semiempirical calculation of π -electron distribution in acridine molecule and its protonated form, pKa of mono and diaminosubstituted acridines were determined. The calculated values agreed well with experimentally determined ones. The highest biological activity was exhibited by compounds in cationic state while in solution. Thus it was shown to be possible to use this method to evaluate biological activity in structurally-analogous compounds. References 8: 7 Russian (2 by Western authors), 1 Western.

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RELIABLE AND UNRELIABLE EFFECTS OF MAGNETIC PROCESSING

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 60, No 4, Apr 87
(manuscript received 27 Nov 85) pp 784-788

[Article by Yu. M. Sokolskiy, Leningrad State Scientific Research and Planning Institute of the Basic Chemical Industry]

[Abstract] An attempt is made to define reliable "effects" of magnetic processing as well as those which are doubtful in the widely used practice of magnetic processing of aqueous systems. Reliable effects include changes in a number of properties in directions opposite to those caused by temperature. These reliable effects are increased if the system processed at the optimal induction of 0.08-0.20 Tl contains ferromagnetic particles or if ultrasonic processing is performed simultaneously with magnetic treatment. Unreliable effects include the appearance of multiple extremes, "seasoning" and other results which cannot be recorded or can be explained without the concept of magnetic processing. References 41: 39 Russian, 2 Western.

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PARAMAGNETIC COMPLEXES OF BENZIDINE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 3, Mar 87 (manuscript received 13 Aug 85) pp 562-567

[Article by K. K. Kalninsh, D. K. Toropov and V. V. Shchukareva, Institute of High Molecular Weight Compounds, USSR Academy of Sciences, Leningrad]

[Abstract] Inclusion of a solvent molecule in a crystalline complex of benzidine (B) and tetracyanoquinodimethane (TCQ) results in low-frequency shift of the charge transfer band, appearance of paramagnetism and a significant increase in conductivity. The nature of the paramagnetic particles and the mechanism of their formation are unknown. This article studies B-TCQ complexes to establish the relationship between specifics of the electron transfer reaction and the nature of interaction of B and TCQ molecules in the crystal. The decrease in charge transfer energy observed results from formation of a H-bond in the excited state of the complex. The paramagnetism is determined primarily by anion TCQ⁻ radicals which arise in the course of the electron transfer reaction. Figure 1, references 10: 2 Russian, 8 Western.

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NEW FOOD--FOUNDATION FOR FUTURE CIVILIZATION

Moscow KHIMIYA I ZHIZN in Russian No 4, Apr 87 pp 66-73

[Article by V. B. Tolstoguzov, doctor of chemical sciences]

[Abstract] Originally, food was obtained by hunting and by gathering wild growing berries. In the course of time, cultivation and domestication revolutionized the life style, leading to many socio-economic developments. Eventually, food sources began to be fractionated into specialized components for reprocessing and thus required storage and preservation. Human beings are the consumers of a long chain in nutritional pathway: green plants, lower animals, higher animals, etc. Conversion of plant protein into animal protein is a very inefficient process even more so as we are throwing away considerable quantities of usable protein. If the energy used in producing food were to be recalculated on the basis of oil reserves, we soon would be totally out of it just in providing food for earth inhabitants. Therefore attention must be directed towards utilization of what presently is considered "waste" protein. A new strategy must be developed for complete utilization of all available protein from natural sources.

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SYNTHESIS, IR-SPECTRAL AND BIOLOGICAL STUDIES OF CERTAIN COORDINATION COMPOUNDS OF SILICON WITH PYRIDINE CARBOXYLIC ACID AMIDES

Tbilisi SOOBASHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian Vol 125, No 2, Feb 87 (manuscript received 26 Apr 85) pp 321-324

[Article by K. I. Tsintsadze, E. A. Kvezereli, E. G. Sirbiladze, R. G. Avetikov, D. M. Dikhamindzhiya, Ye. A. Sarkisov and D. I. Nozadze, Institute of Experimental and Clinical Therapy, GSSR Ministry of Health]

[Abstract] The complexes $\text{SiCl}_2(\text{NCS})_2 \cdot \text{nicotinic acid amide}$ and $\text{SiCl}(\text{NCS})_3 \cdot 6$ isonicotinic acid amide were synthesized by first producing silicon chloride thiocyanates, then adding the corresponding quantity of an acetone solution of the amide to an acetone solution of the chloride thiocyanate. IR absorption spectra were produced. Administration of nicotinic acid amide was found to decrease hematocrit, hemoglobin, color index, blood sugar, arterial-venous oxyhemoglobin difference, ECG R wave voltage, blood fluidity and electrical systole, while increasing blood viscosity, arterial pressure and ECG rhythm. Administration of the fluoride thiocyanate nicotinic acid amide complex decreased blood viscosity, hemoglobin, erythrocytes, color index, erythrocyte catalase index, while increasing hematocrit and arterial pressure, ECG rhythm, R wave voltage and length of electrical systole. Administration of the isonicotinic acid amide derivative synthesized caused a decrease in viscosity, hemoglobin, erythrocytes, erythrocyte catalase index, an increase in hematocrit and arterial pressure. Administration of isonicotinic acid amide alone sharply increased the arterial-venous oxyhemoglobin difference, decreasing erythrocyte catalase index, arterial pressure, ECG rhythm and R wave voltage, while increasing the electrical systole. Figure 1, references: 2 Russian.

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